MARCH 1955

FOUNDRY

...WHEREVER METALS ARE CAST

Vol. 83. #3.

New Ingot Mold Foundry—p. 100

Reclaiming Core Sand—p. 90

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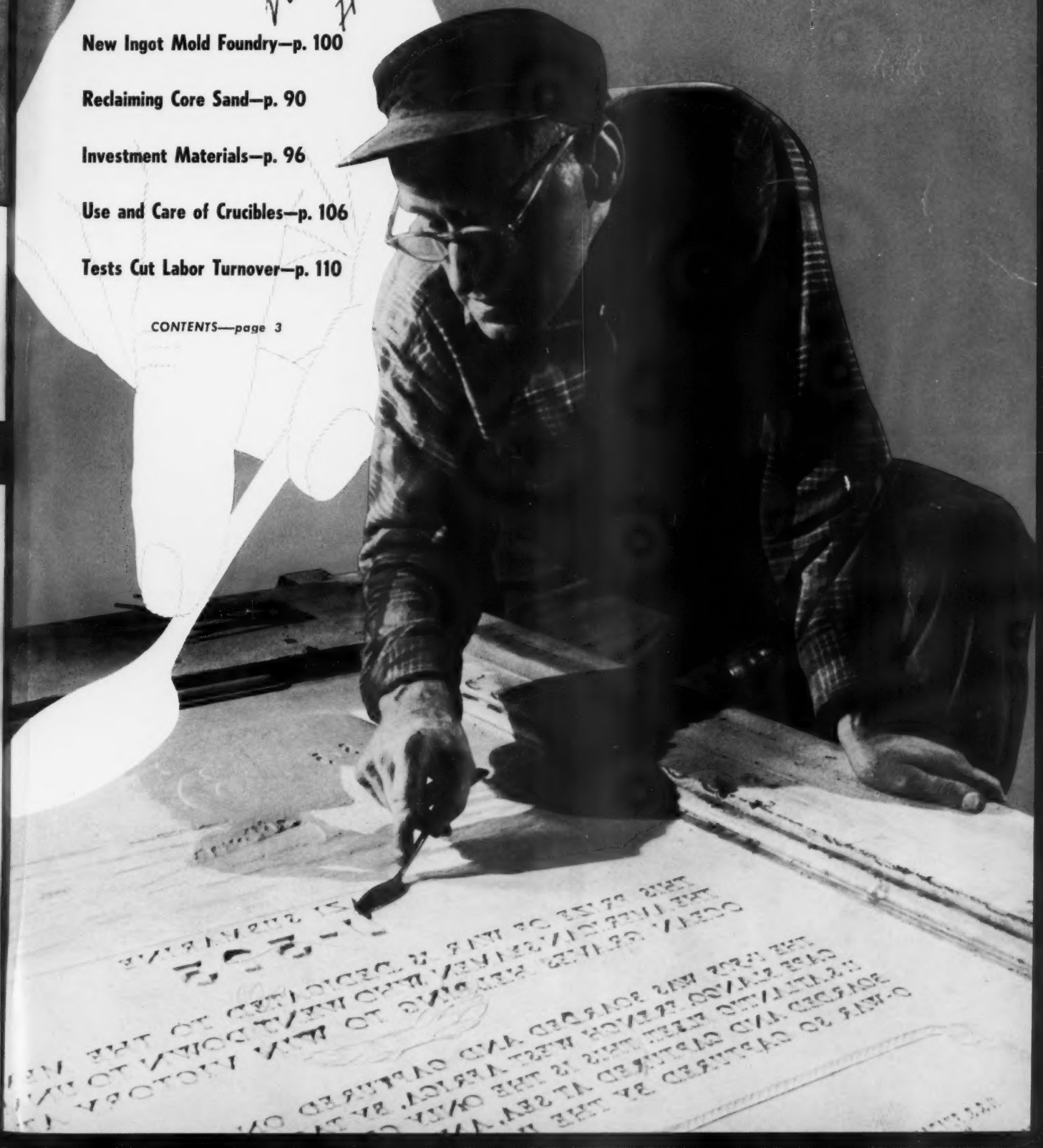

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And iron deoxidized with FERROCARBO® patented Briquettes *is more fluid* at casting temperatures than untreated iron. You can prove this in a ten day test in your cupola. Longer runs are evident from the first day you add FERROCARBO to the charge. After eight to ten days, when the sprues and returns are saturated, the spiral fluidity molds will show ***considerably longer*** runs.

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The man who uses your castings will find them finer-grained, denser, stronger... much easier to machine (and easier on his tools) because they contain fewer segregations, chilled or hard spots.

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"HOW TO SELECT AN OVERHEAD CRANE"

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The information *you* need for planning and selecting the overhead crane that will give the best performance at the lowest cost is contained in a new Whiting booklet . . . Bulletin Unit 79. A helpful, technical bulletin, "How To Select An Overhead Crane" is packed with important data that is of interest to all concerned with heavy materials handling.

A partial list of contents reads as follows:

- The classes of crane service
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- Standard dimensions and clearances
- Recommended speeds
- Motor ratings
- Cage or pendant operation
- How to choose the gear drive
- Structural framework recommendations
- Lubrication of gears and bearings
- 14 minimum safety features
- Erection and initial operation
- Sample form—How to request crane information
- Sample specifications

Write today for Bulletin Unit 79

WHITING CORPORATION

15607 Lathrop Avenue, Harvey Illinois

Taking a *"thumping"* from lumpy shakeout? Don't worry! There's a sure way out! Adding Federal SAND STABILIZER (a processed cellulose sand additive) to your sand, dry or in slurry, will give you a better, less lumpy shakeout, *without* adding other clays to your sand mixture. For, among the many advantages afforded by this highly efficient sand additive is its ability to eliminate lumps in sand shakeout and improve core knockout.

In addition to improving shakeout, you'll find, during the pouring period, that Federal SAND STABILIZER burns out at a much faster rate than any other type of facing material. Since it has a very low ash content and has no deteriorating effect on sand, the re-use of your molding sand can be practiced with *complete safety*.

Federal SAND STABILIZER greatly improves the flowability of sand, too—providing much better ramming conditions. When added to facing or backing sand, more uniformly rammed mold surfaces will be obtained, thus providing smoother casting finish. When added to bentonite slurry, STABILIZER sharply reduces viscosity of solution, permitting the addition of more bentonite to the slurry for greater strength, if desired.

Yes, Federal SAND STABILIZER can be a big help to you! Especially so, if used along with Federal's CROWN HILL SEACOAL—the low sulphur seacoal, and GREEN BOND BENTONITE—the long-lasting bentonite. These three outstanding sand additives will really give you easy, uniform, *thoroughly dependable* sand control. To learn more about them, write for Federal's bulletin: "Tailor-Made Molding Sands".

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FOUNDRY

March 1955

Volume 83—Number 3

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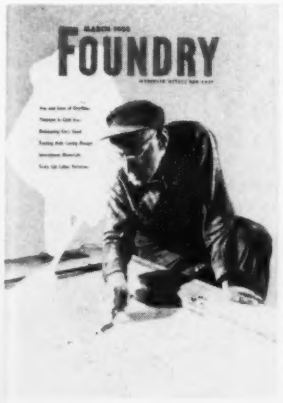

THE COVER: Fred Schick, superintendent, Bronze Inc., Chicago, slicking up a sand mold in the tradition of old-time perfectionists always striving for finer castings. See page 132

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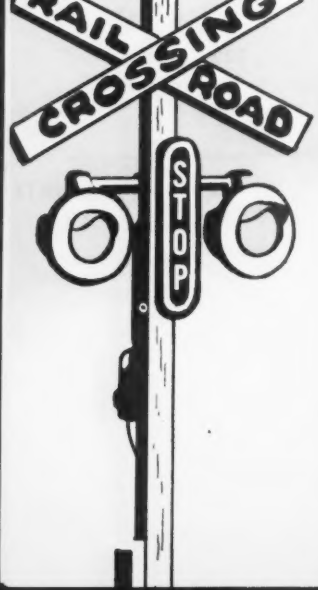
the fastest-moving line in the Foundry Field... on its way to you . . f

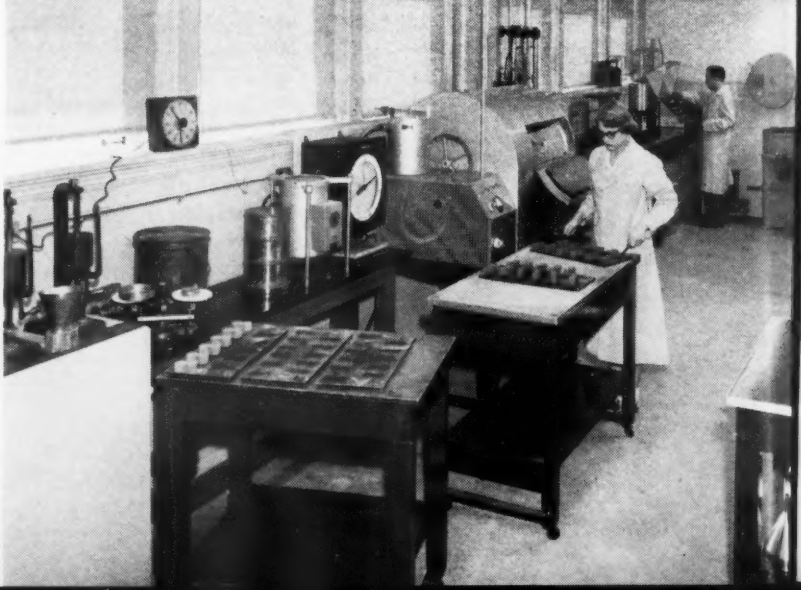
Archer **LIN•O•CEL** is the most effective sand stabilizer available. It improves flowability, which in turn, produces better tolerance and definition. Because LIN-O-CEL compensates for sand expansion, it stops rat-tails, buckles, and scabs which normally might occur due to denser rams made possible by improved flowability.

LINOIL, the most-used core oil in America, produces stronger cores at less cost. You can find among the seven grades of "700 LINOILS", for instance, an oil practically tailor-made to your core requirements. Whatever the grade selected, you can depend upon uniformity from shipment to shipment.



STOP!

Whether or not you are using ADM foundry products, it pays periodically to check your core mixture. Proper use of any material will save you production dollars. Your LINOIL man can assist you in analyzing your specific core problems. He is backed by fully-equipped laboratories, experienced ADM chemists, and foundry technicians who will analyze your problems upon request.



Improved foundry methods demand a constant flow of modified oils and binders, as well as entirely new products for core making and molding. The need today is for greater efficiency at lower cost.

ADM keeps pace with the foundry industry by anticipating its needs through never-ending research. Proof lies in the fact that more than half the core binders consumed in American foundries are made by ADM. Furthermore, foundrymen know they can rely on ADM for absolute uniformity . . . and service second to none.

. . from ONE SOURCE!

INDUCTOL, the new pre-baked core oil, bakes in half the time required for conventional oils. It bakes over a wide temperature range and resists over-baking so that large and small cores can be successfully baked at the same time. INDUCTOL produces considerably less gas than most core oils.

FREFLO is used two ways: (1) As a core sand conditioning agent to reduce stickiness and improve workability. (¼ of 1% by weight should be added during the final 30 seconds of mixing.) (2) As a parting compound for metal molding patterns. FREFLO is a great aid in modern, high-speed equipment.

The most recent addition to the ADM line is **ADMIREZ** resin binders. Available in urea and phenol formaldehyde types in both liquid and powdered forms for cores. Phenol type also available in powdered form for "C" (or shell molding) process.

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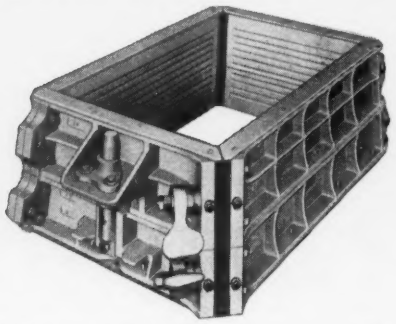
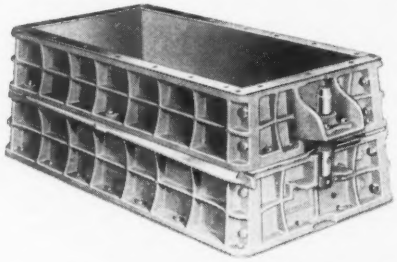


Long-life, easily replaceable, live rubber corner inserts completely close the corner gaps so that no sand can lodge in the open corners.

FREMONT STANDARD SLIP FLASK



The one-inch **GROOV-LOCK FOOLPROOF PIN**, particularly adapted to cope or drag pattern jobs, guarantees perfect alignment indefinitely. (Other types of standard pin fittings available.) Solid, bolted and welded corner construction.

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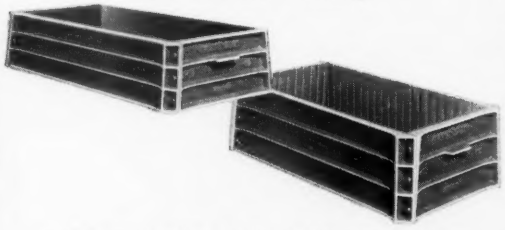

Precision machined and drilled, bolted corner construction permits easy insertion of new sides or ends. The entire jacket need not be scrapped. Standard style for ordinary foundry practice. Grooved style, which permits ready gas escape, for steel foundries. Glass and jackets can be assembled on 3°, 4°, or 5° taper.

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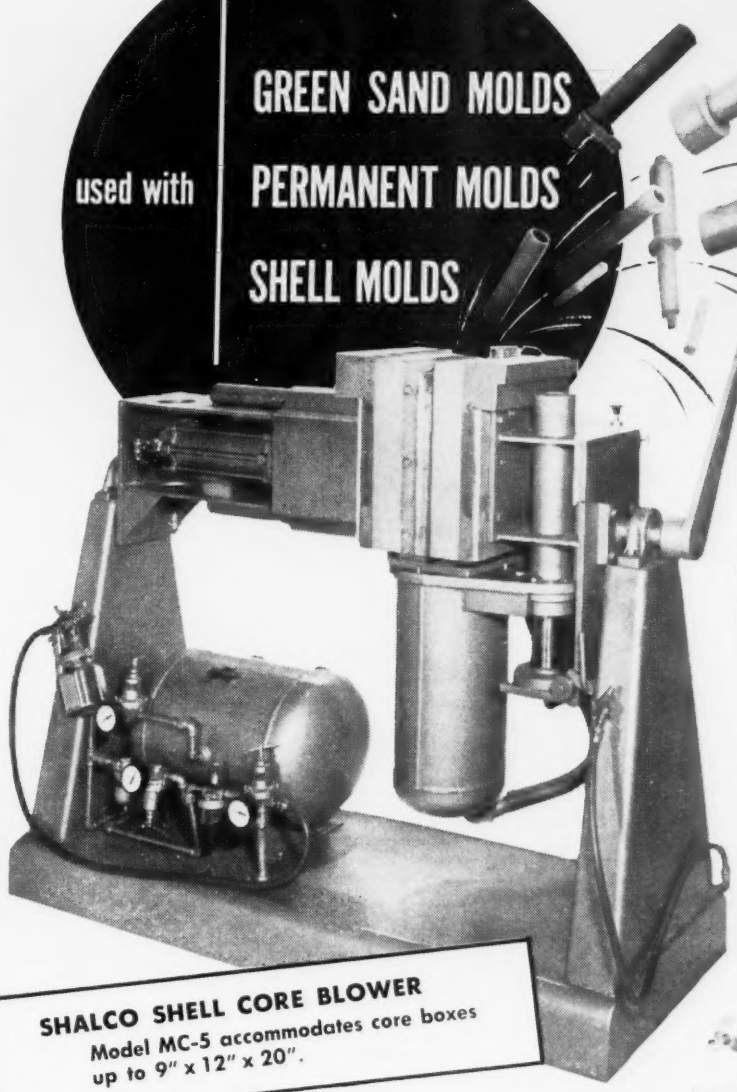
with smooth, precise, collapsible HOLLOW CORES

used with
GREEN SAND MOLDS
PERMANENT MOLDS
SHELL MOLDS



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Model MC-5 accommodates core boxes up to 9" x 12" x 20".

Producing finished cores, ready for setting, in 30 to 50 seconds, Shalco Shell Core Blowers reduce core production costs up to 80%. Core dryers and ovens are eliminated. Excellent burn-out and easy collapsibility of these hollow shell cores cut cleanup time to the bone. Uniform venting and precision finish provide smooth interior surfaces cast to close tolerance. For the shell core blower that's foundry-proved coast to coast, get full details on Shalco!

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Palo Alto, Calif.

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Gentlemen:

☐ Please put me on your mailing list for your *Shal-Tec Bulletin*, summarizing latest shell core and mold techniques and developments.

☐ Please have your representative contact me.

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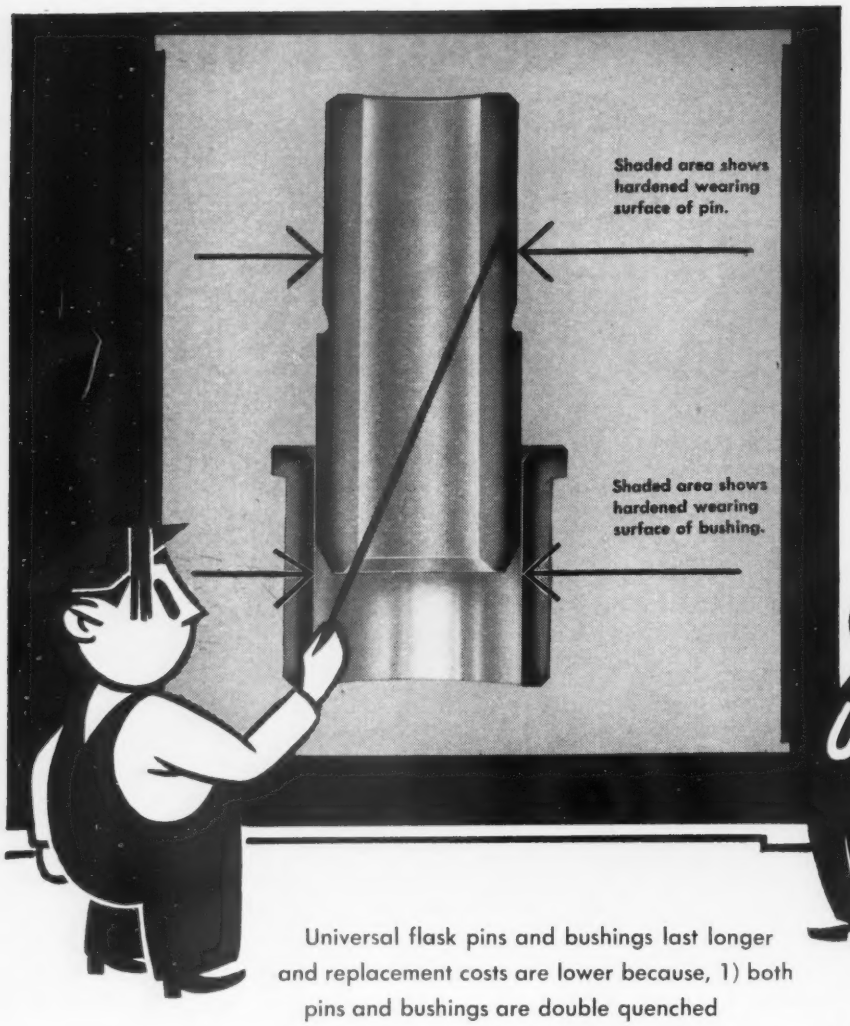

how the long life of UNIVERSAL flask pins and bushings saves dollars in your foundry operations

Universal flask pins and bushings last longer and replacement costs are lower because, 1) both pins and bushings are double quenched and double drawn to produce strong, ductile cores that can take rough treatment in the foundry without breaking or chipping and, 2) wearing surfaces are carburized and hardened to withstand wear. Universal flask pins and bushings are precision ground to insure instant, accurate alignment of cope and drag. For complete information, write to Universal Engineering Sales Co., 1060 Broad St., Newark 2, N.J.; 5035 Sixth Ave., Kenosha, Wis.; or the home office.

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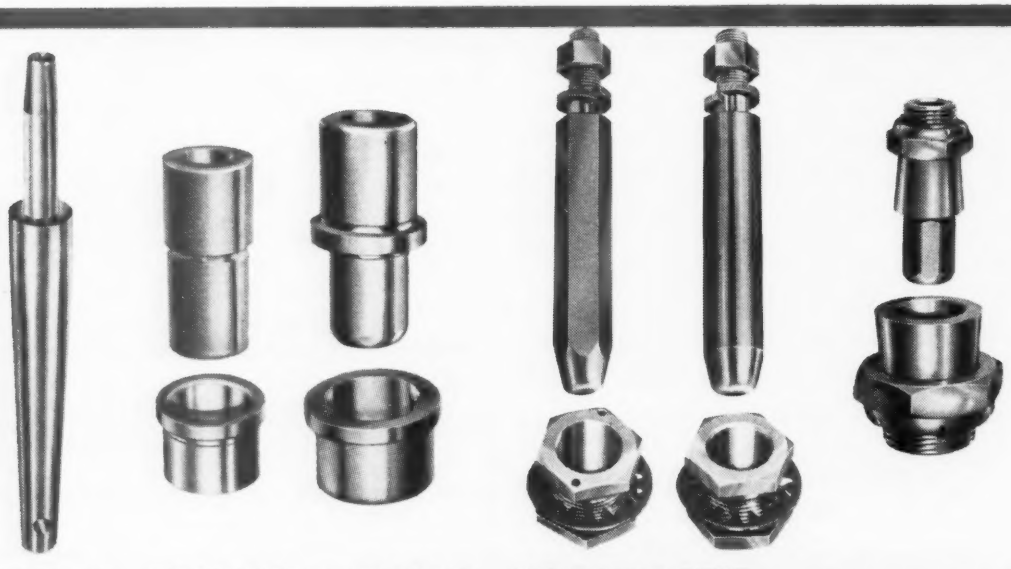

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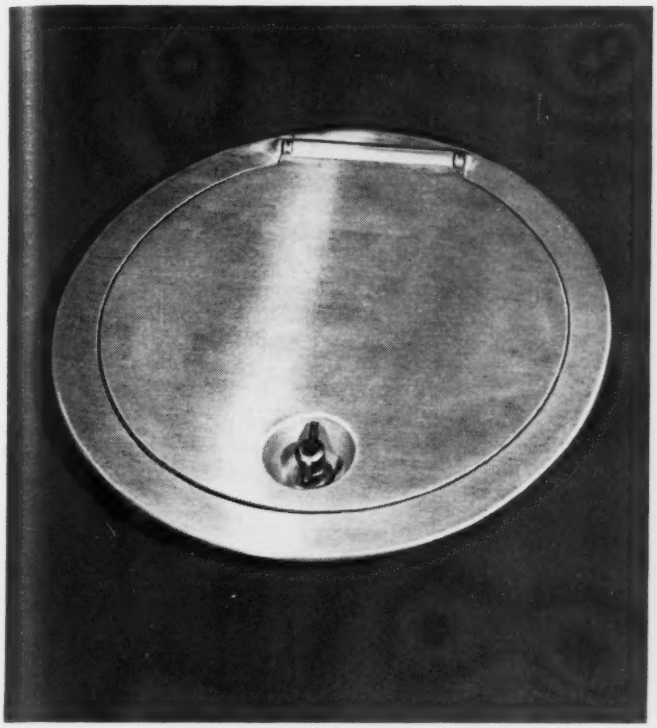
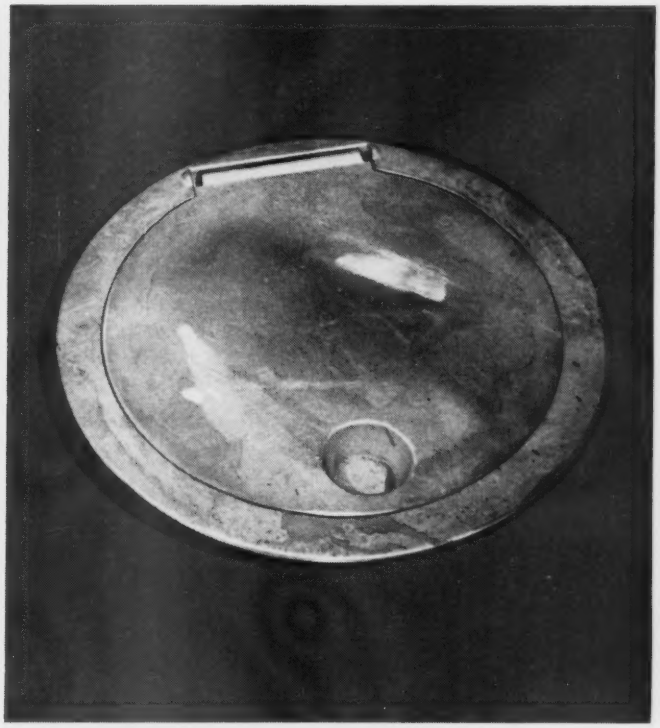
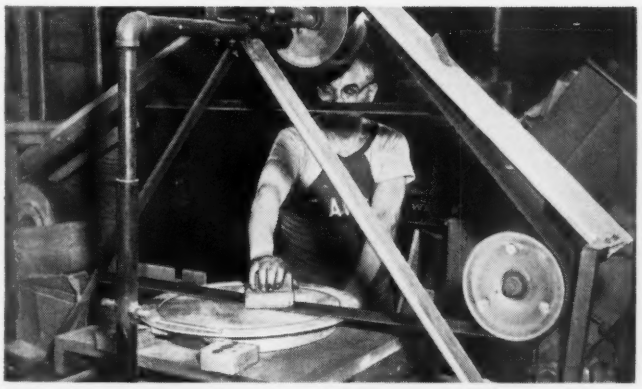
3M METHOD—better from start to finish





3M Abrasive Belts increase production 50% for Connecticut Foundry



25 finished castings per belt on this unusual 3M installation! 3M Coated Abrasives are versatile production "tools," designed to do the best possible grinding and finishing job.

Made in U.S.A. by Minnesota Mining and Mfg. Co., St. Paul 6, Minn.—also makers of "Scotch" Brand Pressure-Sensitive Tapes, "Scotch" Brand Magnetic Tape, "Underseal" Rubberized Coating, "Scotchlite" Reflective Sheeting, "Safety-Walk" Non-slip Surfacing, "3M" Adhesives. General Export: 122 E. 42nd St., New York 17, N. Y. In Canada: London, Ont., Can.

Brown Bros. Foundry, Inc., Stamford, Conn., obtained this production increase when they switched to the 3M Method of grinding and finishing the flat areas on cast aluminum garbage disposal covers. Their former method of wire brushing was slow and difficult, left unsatisfactory finishes. A 3M Representative suggested that a stroke sander—using 3M Abrasive Belts—would solve the problem. Result—production increased 50% with far better finishes!

Here's further proof of the efficiency of 3M Coated Abrasives, *and* of the 3M Representative. He's an expert on coated abrasives who can show you how the 3M Method can work best in *your* foundry. Send coupon today for facts.

Write today for FREE booklet!

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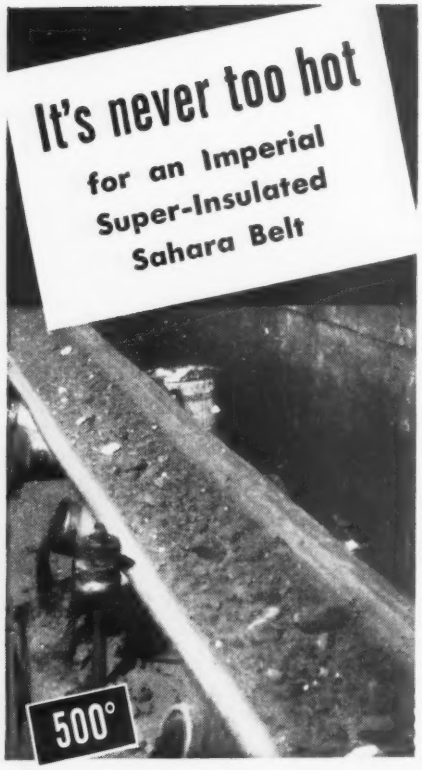
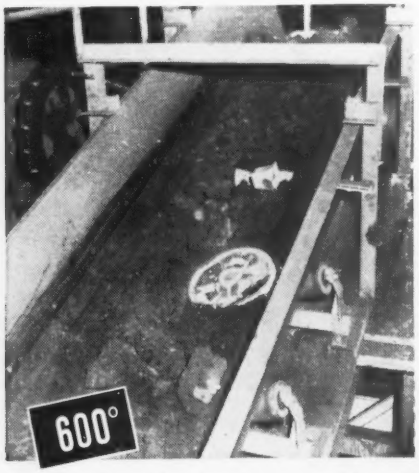


At American Chain & Cable Co., this belt ran 24 hours a day, 5 days a week for over 2 years—handling hot shakeout sand with temperatures up to 500°. During this time production was accelerated and equipment operated at top speed.



$750 per hour shutdowns were eliminated by a farm implement company when they installed this belt to convey white-hot castings and knockout sand. Result: $30,000 saving in 12 months.

• • • • • •

Write for data sheet 54-2 and case histories on belts for handling hot materials.

Imperial
BELTING CO.
1755 S. KILBOURN AVE., CHICAGO 23, ILL.

You expect more from Imperial
. . . and you get more.

With the Editors

ARTICLES NOW PACKAGED: Now and then one of our faithful readers has sent along a protest over the practice of starting some feature articles in the front editorial section, and then continuing them in the back of the book. These fine foundrymen clip and file for future reference many of the articles appearing in this old family journal. They report that our make-up practices (which incidentally are used by many general magazines) result in great difficulty in following this clipping practice. Dr. James T. MacKenzie, American Cast Iron Pipe Co., Birmingham, probably has been the most vociferous in the campaign for make-up reform.

A change of this sort is not simple. However, the editors have worked long and hard on the problem and have come up with a successful solution. Starting with this issue, all articles in FOUNDRY will be presented as a unit, with no continuations to other parts of the magazine. Hope you like it.

—o—

Serves for 50 Years: FOUNDRY congratulates Mary Monckton, who recently completed 50 years as a secretary with the Whiting Corp. In recognition of this exceptional record of service, she was presented with 50 shares of stock of the company at a dinner attended by employees who have been with the company 25 years or more.

In making the presentation, Stevens H. Hammond, chairman of the board, pointed out that while it is

unusual for a man to work for one company for 50 years, it is even more remarkable for a woman to achieve that record. When Miss Monckton joined the organization, J. H. Whiting, founder of the company, was still actively leading the business. At that time there were 250 employees, whereas today over 1200 men and women are employed by the company.

Although the corporation has an employee retirement plan, Gen. Thomas S. Hammond, when head of the organization, instituted a policy of giving special attention to individuals asking to continue work after 65, and this plan has been continued since that time.

—o—

An Opportunity for Foundrymen: As previously announced, the eighth annual College-Industry Conference of the Foundry Educational Foundation will be held in Cleveland, Mar. 9-10. In discussing the coming meeting, Thomas Kaveny Jr., president, Herman Pneumatic Machine Co., Pittsburgh, and president of FEF, wrote as follows:

"Those of us who have attended these conferences in the past have always regretted that more men from industry have not taken advantage of them. All the faculty members of the Foundation's schools do attend and when we see their enthusiasm it truly is a revelation. Some from industry make a habit of attending and practically without exception state the conference is more than worthwhile to them. Knowing that men from industry are in attendance, many of the faculty members level their remarks directly to those from industry and in so doing the executives and personnel men profit greatly."

The theme of the conference this year links engineering education to castings sales. I believe that every foundryman attending will be well repaid for the time and effort expended. Furthermore, a good attendance from industry will do much to assure the representatives from the technical institutions that the foundry industry is up and coming, that it offers a good field for young engineers, and that castings are one of the basic components in any type of construction utilizing metals. These, of course, are the goals of the FEF.

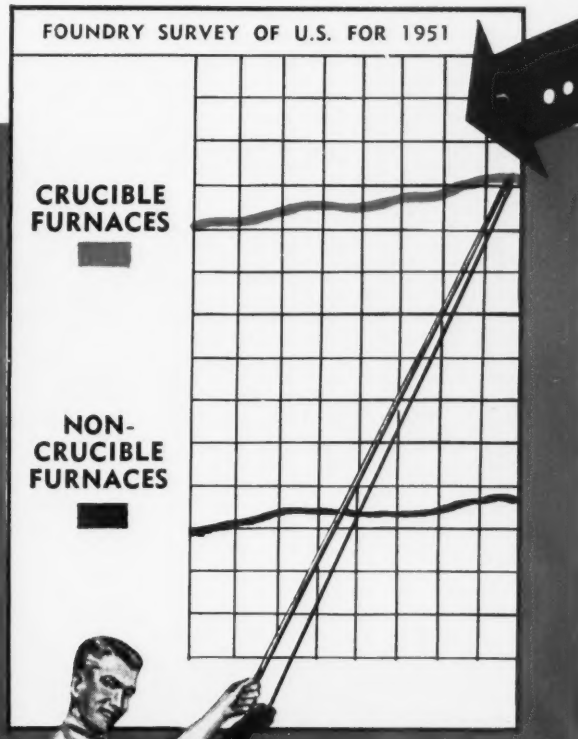
Hope to see you in Cleveland, Mar. 9-10.

—o—

Hoover Honored by Publishers: Bill Gude, George Pope and I as well as the editors and business managers of other Penton magazines, were in Washington on Saturday, Jan. 29, to attend the Silver Quill Award Dinner of the National Business Publications, the trade associa-

CRUCIBLE MELTING

... LEADS three to one



A foundry survey* of the United States for 1952 gives capacity of all Crucible furnaces at 6,043,720 lbs. of non-ferrous metals: all non-Crucible furnaces, capacity, 1,332,585 lbs.

According to the same survey, the total capacity per charge of all Crucible furnaces is rapidly increasing; thus, in 1951 the Crucible furnace capacity was 4,703,037 lbs., an increase for 1952 of 1,340,683 lbs. or 28%.

Foundrymen know their melting methods. Such persistent popularity and preference result from a combination of advantages obtainable only with Crucible melting.

*"The Foundry Market" Published by *Foundry*

Have you seen the new "'CRUCIBLE CHARLIE' says . ." leaflets issued by Crucible Manufacturers Association? If not, ask your superintendent about this. He has a copy.

CRUCIBLE MANUFACTURERS ASSOCIATION
27 WILLIAM STREET NEW YORK 5, N. Y.

THESE FIRMS CAN TAKE CARE OF ALL YOUR REQUIREMENTS FOR CRUCIBLE MELTING

AMERICAN REFRACTORIES & CRUCIBLE CORP.

ELECTRO REFRACTORIES & ABRASIVES CORP.

JOSEPH DIXON CRUCIBLE CO.

ROSS-TACONY CRUCIBLE CO.

LAVA CRUCIBLE-REFRACTORIES CO.

VESUVIUS CRUCIBLE CO.

BATTERY OF EIGHT STYLE 1303 HAUSFELD "LADLE-OUT" FURNACES

for die casting, shell molding and permanent molding

• The *Hausfeld* stationary or "ladle-out" furnaces are designed for die casting, permanent molding and shell molding. However, this style has been giving excellent results in sand foundries of all sizes, requiring a unit that would not only melt the metal, but hold it at a given temperature to meet production requirements. These furnaces accommodate the latest bowl-type crucibles and with the new Hausfeld Cover-Venting top construction give easier access to the entire bath of metal for dipping out. Capacities: 200 to 1000 pounds.

• Check your present melting costs. If they are high, they may be losing business for you. Let us make recommendations for Hausfeld Furnaces to meet your requirements, and cut your costs. Write for Bulletin 103 on crucible aluminum furnaces, or literature on any non-ferrous melting job. THE CAMPBELL-HAUSFELD CO., 300-320 Moore Street, Harrison, Ohio.

Hausfeld

METAL MELTING FURNACES

tion in the business magazine field to which FOUNDRY belongs. We were thrilled when the Silver Quill for 1955, the highest honor of the NBP, was awarded to Herbert Hoover, former president of the United States, and for many years one of the staunch supporters of the business press as an important means of communication between government and industry. The presentation was made by Richard M. Nixon, vice president of the United States, and last year's Silver Quill Award winner.

—o—

Castings Contributed: Usually any extra time in Washington is devoted to visits with those departments in government that in some way touch upon the operations of the foundry industry. But since most government agencies do not operate on Saturday, a number of us decided to re-visit the Smithsonian Institution.

The trip was most interesting. As we studied the early steam engines, electrical equipment, automobiles, and other mechanical developments, we could not help but be impressed with the importance of the foundry industry in the progress in all types of machines. If skilled foundrymen had not been able to make intricate castings of good quality, our progress in the mechanical arts would have been slow indeed.

—o—

Similar Credit in Britain: The same idea is brought out in a booklet, "Years of Endeavor—The Ironfounding Industry's Work for Health and Safety," published by the Council of Ironfoundry Associations of the United Kingdom. This booklet states:

"Ironfounding is one of the oldest British industries. It existed long before the industrial revolution, in which it played an essential part. The practical application of steam to the factory was made possible largely by the ironfoundry, where skill in accurate molding, already long developed, made possible the casting of large but relatively thin-walled cylinders, the heavy flywheels and the supporting members of the earlier power units."

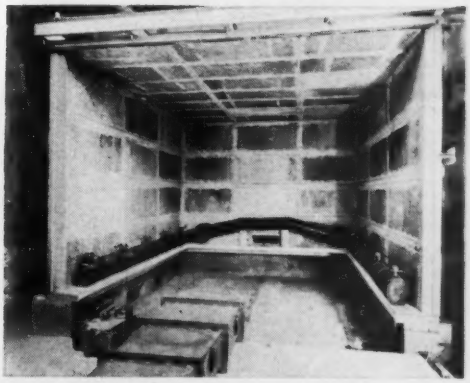
—o—

Meditations of a Sandman: A new department which will run from time to time makes its first appearance on page 246 of this issue. Called "Meditations of a Sandman," it is written by Harold E. Henderson, a foundryman of long experience. We think you will find his observations worthwhile. F. G. S.

INDUSTRY REPORTS:

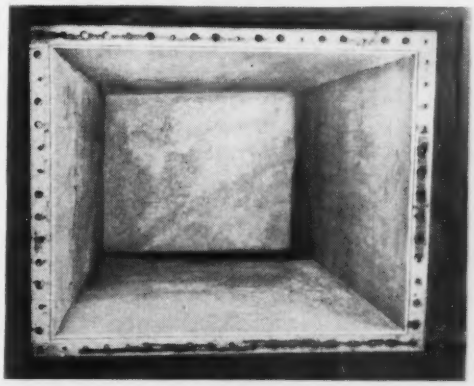
cost-reducing uses for

Refractory Castable Insulation



Roof and wall panels are made of B&W Insulating Concrete Mix in this stress relieving furnace.

Covers, measuring six and eight feet in diameter, for these 10 draw and hardening furnaces are also lined with B&W Insulating Concrete Mix.



Shown above is a section of a gas turbine exhaust stack lining completely cast with B&W Insulating Concrete Mix.

Here are a few examples of how furnace operators are cutting installation and fuel costs with versatile insulating concretes.

In intricate furnace linings, for instance, B&W Insulating Concrete Mixes do away with time-consuming hand fitting and the many necessary special shapes. These refractory concretes, which can be exposed to flame up to 2200F, have approximately twice the insulating value of regular refractory castables, and are as easy to use.

Other uses include: Holding furnace roof panels, Portable furnace extensions, Annealing furnace bung covers, Patching insulating firebrick linings, Lining ducts and flues, Protection for furnace foundations, Hardening furnace cover linings, Car bottom linings, Cooling pit walls and roofs, Dust collector linings, Door linings, Protection for furnace steelwork.

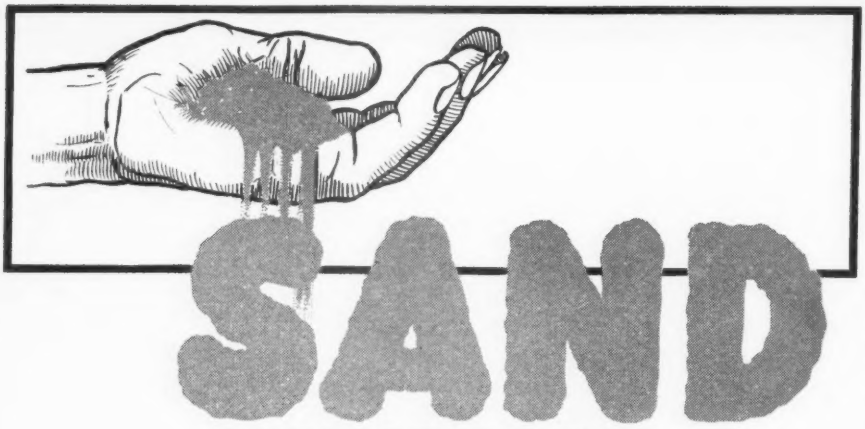
Briefly, B&W Insulating Concrete Mixes can be put to profitable use wherever the combination of a castable's fast, low cost installation plus insulation is needed. Though somewhat less efficient thermally than B&W Insulating Firebrick, B&W Insulating Concrete Mixes are far superior to regular castables in insulating value. In fact, 7 inches of B&W Insulating Concrete Mix are equivalent, in insulating value, to 24 inches of regular refractory concrete or firebrick.

Get all the facts from your local B&W Refractories Engineer—or write for Bulletin R-22, which gives complete details on B&W's entire line of refractory castables.

B&W REFRACTORIES PRODUCTS: B&W Allmul Firebrick • B&W 80 Firebrick
B&W Junior Firebrick • B&W Insulating Firebrick • B&W Refractory Castables, Plastics and Mortars
OTHER B&W PRODUCTS: Stationary & Marine Boilers and Component Equipment
Chemical Recovery Units • Seamless & Welded Tubes • Pulverizers • Fuel Burning Equipment
Pressure Vessels • Alloy Castings

BABCOCK & WILCOX
THE BABCOCK & WILCOX CO.
REFRACTORIES DIVISION
GENERAL OFFICES: 161 EAST 42nd ST. NEW YORK 17 N.Y.
WORKS: AUGUSTA, GA.

B-324



SAND

PRODUCERS OF:

MANKO DRIED & SCREENED SILICA SAND:
Grain Fineness 50-75

MANKO SILICA FLOUR:
Foundry Grade—140 Mesh

MB DRIED & SCREENED LAKE SAND:
Grain Fineness 48-52

MICHIGAN CITY DRIED & SCREENED LAKE SAND:
Grain Fineness 53-55

MICHIANA DRIED & SCREENED LAKE SAND:
Grain Fineness Approx. 70

HIGH DENSITY BLENDED DRIED & SCREENED LAKE SANDS:
Grain Fineness 55-65

LIME FREE SAWYER SCREENED LAKE SAND:
Pit Moisture—Open or Closed Cars

MICHIGAN CITY SCREENED LAKE SAND:
Pit Moisture—Open or Closed Cars

DUNE PARK SCREENED LAKE SAND:
Pit Moisture—Open or Closed Cars

GARY SCREENED LAKE SAND:
Pit Moisture—Open or Closed Cars

MICHIANA SCREENED BANK SAND:
Grain Fineness Approx. 70—Open or Closed Cars

WABASH SCREENED BANK SAND:
Grain Fineness 80-100—Pit Moisture—Open or Closed Cars

DISTRIBUTORS OF:

RED CEDAR DRIED, MILLED & SCREENED MOLDING SAND:
Tennessee—Approx. Permeability Range 190-470

CYPRESS DRIED, MILLED & SCREENED MOLDING SAND:
Tennessee—Approx. Permeability Range 7-160

MAPLE DRIED, MILLED & SCREENED MOLDING SAND:
Indiana—Approx. Permeability Range 4-70

SWEDEN DRIED, MILLED & SCREENED MOLDING SAND:
Indiana—Approx. Permeability Range—80-100

VOLCLAY WESTERN BENTONITE

PANTHER CREEK SOUTHERN BENTONITE

KIOWA DRIED & SCREENED SILICA SAND:
Grain Fineness—35-90

KIOWA 100 DRIED & SCREENED SILICA SAND:
Shell Molding—D Process—Velvet Finish Cores

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MEETING CALENDAR

Mar. 1-2—American Society of Mechanical Engineers, international congress on air pollution, Hotel Statler, New York

Mar. 9-10—Foundry Educational Foundation, college-industry conference, Hotel Cleveland, Cleveland

Mar. 14-15—Steel Founders' Society, annual meeting, Drake Hotel, Chicago

Mar. 25-26—California Regional Foundry Conference, Huntington Hotel, Pasadena, Calif.

Mar. 28-29—American Institute of Electrical Engineers, overhead crane technical conference, Hotel Cleveland, Cleveland

Mar. 28-Apr. 1—American Society for Metals, ninth Western Metal Congress and Western Metal Exposition, Pan-Pacific Auditorium, Los Angeles

Apr. 7-8—Malleable Founders' Society, market development conference, Edgewater Beach Hotel, Chicago

Apr. 15—Foundry Equipment Manufacturers Association, spring meeting, Sheraton-Carlton Hotel, Washington

Apr. 18-20—American Institute of Mining & Metallurgical Engineers, national open hearth conference, Bellevue-Stratford Hotel, Philadelphia

Apr. 27-29—Society for Experimental Stress Analysis, spring meeting, Hotel Statler, Los Angeles

May 16-18—Industrial Heating Equipment Association, spring meeting, The Homestead, Hot Springs, Va.

May 16-20—Sixth National Materials Handling Exposition, International Amphitheater, Chicago

May 19-21—Non-Ferrous Founders' Society, annual meeting, Congress Hotel, Chicago

May 23-27—American Foundrymen's Society, 59th annual convention, Houston, Tex.

May 31-June 3—Design Engineering Show, Convention Hall, Philadelphia

May 22-26—Air Pollution Control Association, 48th annual meeting, Detroit

May 23-25—American Management Association, general management conference, Roosevelt Hotel, New York

June 7-10—American Welding Society, national spring meeting and exposition, Municipal Auditorium, Kansas City, Mo.

June 16-18—Malleable Founders' Society, annual meeting, the Greenbrier, White Sulphur Springs, W. Va.

June 26-28—Alloy Casting Institute, annual meeting, The Homestead, Hot Springs, Va.

June 26-July 1—American Society for Testing Materials, annual meeting, Chalfonte-Haddon Hall Hotel, Atlantic City, N. J.

July 12-14—Western Plant Maintenance Show, Pan Pacific Auditorium, Los Angeles

Sept. 6-17—National Machine Tool Builders Association, machine tool show, International Amphitheater, Chicago

Sept. 6-17—Production Engineering Show, Navy Pier, Chicago

Oct. 6-7—National Foundry Association, annual meeting, Edgewater Beach Hotel, Chicago.

Oct. 13-15—Foundry Equipment Manufacturers Association, annual meeting, The Greenbrier, White Sulphur Springs, W. Va.

Oct. 16-18—Conveyor Equipment Manufacturers Association, annual meeting, The Greenbrier, White Sulphur Springs, W. Va.

Oct. 17-21—American Society for Metals, national metal exposition and congress, Convention Hall, Philadelphia

Oct. 19-21—Gray Iron Founders' Society, annual meeting, Schroeder Hotel, Milwaukee

Oct. 20-21—Missouri Valley Regional Foundry Conference, sponsored by St. Louis, Tri-State, and Mo-Kan Chapters of AFS and Missouri School of Mines Student Chapter, at Missouri School of Mines and Metallurgy, Rolla, Mo.

Oct. 24-25—Steel Founders' Society of America, fall meeting, The Greenbrier, White Sulphur Springs, W. Va.

Nov. 1-3—Grinding Wheel Institute and Abrasive Grain Association, fall meeting Statler Hotel, Buffalo

Nov. 14-17—Second International Automation Exposition, Navy Pier, Chicago

Nov. 16-18—Steel Founders' Society, annual technical and operation conference, Hotel Carter, Cleveland

Dec. 1-2—Michigan Regional Foundry Conference, Michigan State College, East Lansing, Mich.

Dec. 7-9—American Institute of Mining & Metallurgical Engineers, electric furnace steel conference, Hotel William Penn, Pittsburgh

Nobody can match profits with the low-cost producer

YOU know that "Cost of production" fixes your profit in foundry operation . . . that "Cost of production" gets orders . . . or loses them.

With a modern Tabor Rollover you can . . .

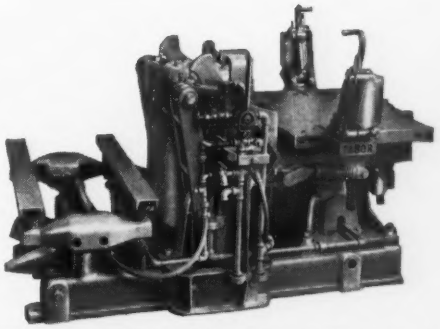
- change patterns in less than a minute.
- get up to 50% more castings than with an obsolete molding machine.
- get 250% to 400% more castings than by floor molding.

And you get these special Tabor features . . .

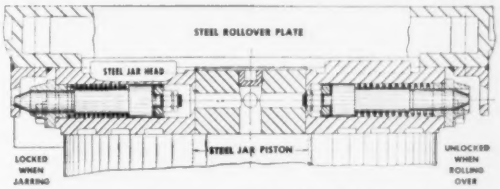
- "Shockless jar"— that prevents damage to finished cores on the racks, in the ovens, or on the machine.
- Patented locking device for rollover plate and jar head—that does away with plate wobble . . . ends secondary jolt . . . increases effectiveness of jarring blow by 25% . . . and gives equal ramming all over the mold.

MR. FOUNDRYMAN:

At no cost to you, a Tabor engineer will show you how you can start a modernization program which will reduce labor and unit cost . . . increase production . . . and result in more profits at year's end. Write today.



22" Tabor Rollover. Tabor Power Rollovers range from 450 lb. to 3,000 lb. capacity. Choice of portable-shockless or stationary-plain-jar.



Tabor's rollover plate and jar head locking feature (patented). Jarring air pressure automatically throws rugged pins into seats under plate. Pins retract under spring tension when jarring valve is closed.

Flask Lift Machines • Squeezers and Jar Squeezers
Jarring Machines • Rollover Machines
Abrasive Cut-Off Machines • Vibrators

The TABOR Manufacturing Co.

Division of
TURBO MACHINE COMPANY
LANSDALE, PA.

Want to really cut cleaning room costs?

switch to

CINCINNATI

PD

Snagging Wheels

IF YOUR cleaning room costs are slicing deep into your profits, switch to CINCINNATI (PD) SNAGGING WHEELS—the greatest grinding wheel development in years! CINCINNATI (PD) WHEELS will absolutely cut your cleaning room costs . . . saving you money four important ways:

- LONGER WHEEL LIFE—Through longer life of CINCINNATI (PD) WHEELS, users have reported almost *double* the production per wheel. One customer, using a portable grinder, gets almost *twice* the life with a CINCINNATI (PD) Flared Cup. Another user, snagging cylinder blocks on a swing frame, has increased the production per wheel *45%* with (PD) WHEELS.

- FREER CUTTING—You can get more pounds of metal per hour with the grains and bonds specified by Cincinnati for your jobs. Operators like the fast, easy cutting action of CINCINNATI (PD) WHEELS.

- SELF-DRESSING ACTION—The CINCINNATI (PD) WHEELS specified for your job by Cincinnati abrasive engineers require few, if any, dressings. With the right grade wheel, new cutting grits are bared as soon as old grits get dull and inefficient.

- POSITIVE DUPLICATION (PD)—"On grade" with a CINCINNATI (PD) WHEEL means all future (PD) WHEELS will act and grind exactly alike.

CINCINNATI (PD) WHEELS are made in vitrified and resinoid bonds for both ferrous and non-ferrous foundries and are available in a complete variety of sizes and shapes. *Yet these better, cost-cutting* CINCINNATI *(PD)* WHEELS *are priced no higher than ordinary wheels.*

We'll be happy to prove to you how CINCINNATI (PD) WHEELS can increase your production and cut your cleaning room costs. Just contact us and we'll send one of our representatives. Wire, write or telephone Sales Manager, Cincinnati Milling Products Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.

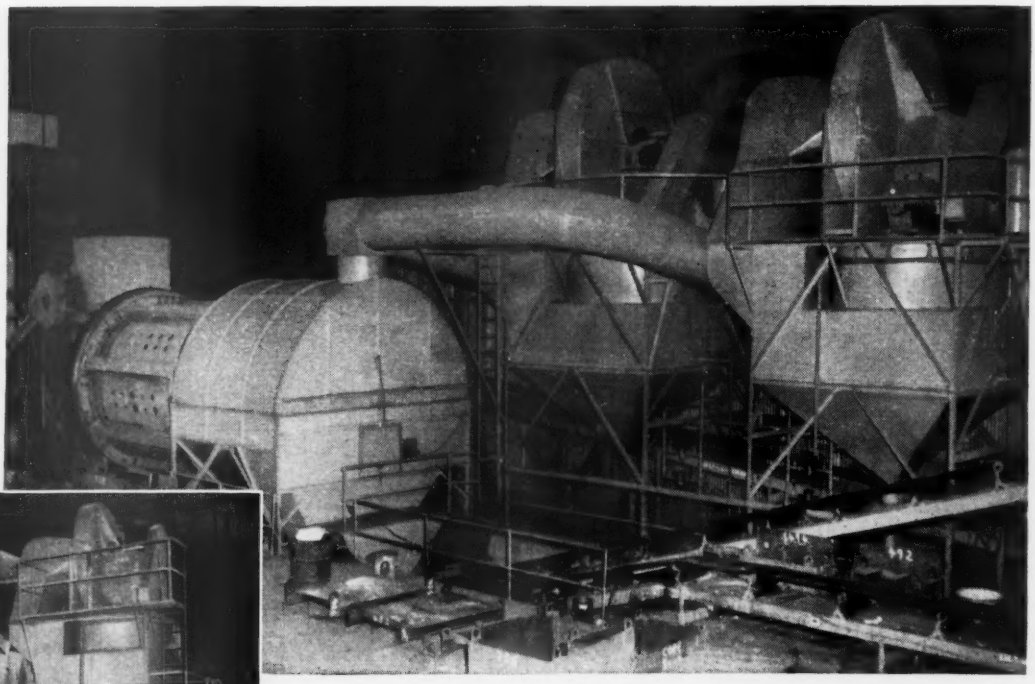
CINCINNATI
Grinding Wheels

A PRODUCTION-PROVED PRODUCT OF THE CINCINNATI MILLING MACHINE CO.

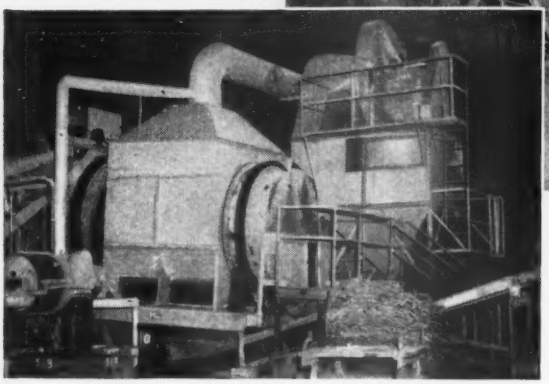
ROTO-CLONES "WRAP UP"

1½ TONS of DUST per HOUR!

43 lbs. of dust per minute is exhausted from core breaker by Type W ROTO-CLONE.



10 lbs. of dust per minute is collected from this sand screen by Type W ROTO-CLONE.



Over 50 lbs. of dust per minute collected from foundry core breaker and sand screen

THIS large steel foundry handles 150 tons of sand per hour. Two of the worst offenders from the standpoint of dust were the core breaker and sand screen—until the problem was assigned to ROTO-CLONE.

Illustrated at upper right is the core breaker which is exhausted by a Type W ROTO-CLONE of 60,000 cfm capacity. Every minute this unit is in operation results in the collection of 43 lbs. of dust. The 6 ft. diameter sand screen, pictured at lower left, is also served by a Type W ROTO-CLONE of 14,000 cfm capacity, which collects 10 lbs. of dust per minute. Both collectors are equipped with built-in Precleaner which removes the bulk of dust from the exhaust air by centrifugal force.

50 lbs. per minute, 1½ tons per hour! How's that for processing heavy dust concentrations of abrasive sand? Such efficiency results from the Type W's design which combines the scrubbing effect of water sprays with the principle of dynamic precipitation. What's more, there's no secondary dust problem as collected material is discharged as a slurry.

These are but two of scores of tough dust collection jobs which AAF Dust Control Equipment is handling as "run-of-the-mill" operations. For complete product information call you local AAF representative or write direct.

AAF herman nelson

American Air Filter
COMPANY, INC.

American Air Filter of Canada, Ltd., Montreal, P. Q. • 266 Central Avenue, Louisville 8, Kentucky

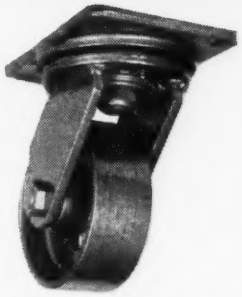
Choose This RUGGED COLSON TRUCK for your roughest, toughest handling jobs

The COLSON Push E-Z Truck

is a heavyweight champ that takes any beating you can give it and comes back for more. It's the strongest hand truck ever built. Capacity with metal or molded plastic wheels, 6000 pounds; with rubber-tired wheels, 3000 pounds. Platform is of steel or selected hardwood.

Despite its unusually heavy, rugged construction, comparative tests show that this truck, fully loaded, starts and rolls with but slightly more than half the effort required to move the average factory truck.

COLSON ForgeWeld Casters



Here's the world's finest caster for extra heavy duty requirements. Wheels of cast steel, iron, rubber or molded plastic in capacities up to 6000 pounds per caster.

Equip your shop trucks with COLSON ForgeWelds, and your caster replacement problems are over.

Whether you are interested in a fleet of factory trucks or one set of replacement casters, it pays you to call on COLSON — maker of the country's most varied line of quality materials-handling products.

Write us for free booklet on COLSON materials-handling equipment, or better still, look in the yellow pages of your local phone book (under "Casters" or "Trucks — Industrial") for the COLSON office near you.

CASTERS • HAND TRUCKS • LIFT JACK SYSTEMS
HYDRAULIC, ELECTRIC AND MECHANICAL POWER LIFTS AND TRANSPORTS

THE Colson® **CORPORATION**

Elyria, Ohio

really NEW... ... FOR PORTABLE GRINDERS

"GRINDAWAY"* wheels with SAFETY RINGS which grind away

. . . they assure you of increased safety, because they reduce the danger of "bursting"

If you have ever been around when a grinding wheel "explodes", you know what can (and often does) happen . . . it's not only frightening, but can be very dangerous.

But now, we of Colonial, have, after many years of grinding wheel experience, developed the "GRINDAWAY" reinforced resinoid high speed wheel for portable grinding. This wheel not only offers a greatly *increased safety factor*, but in addition, is the same high quality wheel that Colonial has always manufactured.

The "exclusive" feature of this new wheel is the reinforced rings, which have a higher Tensile strength than steel . . . and, these rings are inserted right where the reinforcement is needed: in the actual grinding portion of the wheel . . . this is only made possible, because they abrade away as the wheel wears through them.

Colonial offers "GRINDAWAY" Safety Wheels in three types: straight, recessed, and flaring cup . . . all available *without any premium cost.*

Of course, Colonial continues to offer industry a complete line of regular Vitrified and Resinoid wheels for every grinding need, plus their personalized grinding wheel Engineering Service.

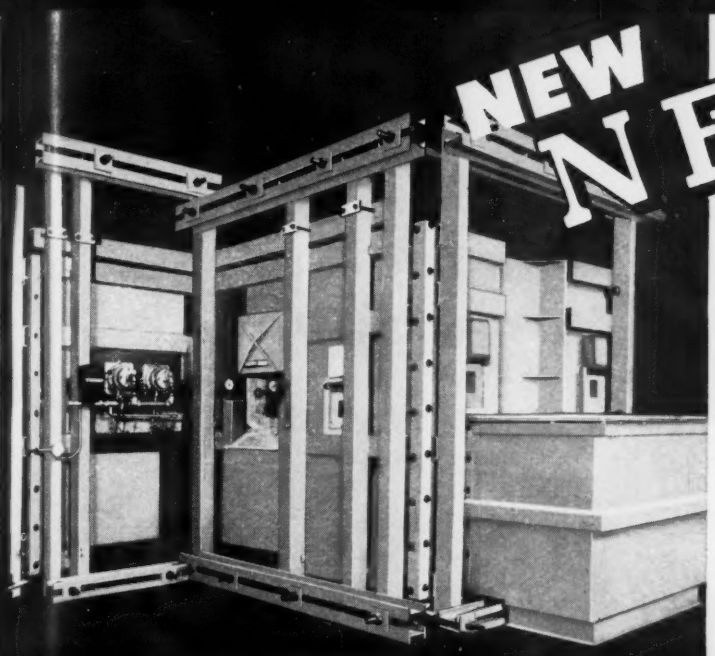
Write, wire or phone Colonial today regarding your grinding problems . . . You will receive prompt, courteous attention and worth-while advice.

*Patent applied for

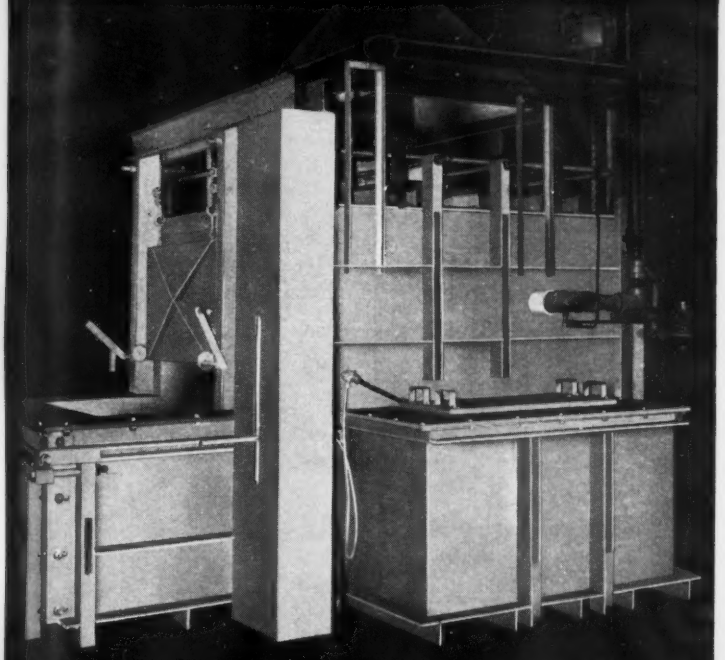
FREE LITERATURE UPON REQUEST

NOTE: In testing laboratories GRINDAWAY Wheels have been purposely cracked, and then run at speeds considerably higher than normal operating speeds "without bursting"

COLONIAL ABRASIVE PRODUCTS CO.
SIXTH AND HARRY STREETS
CONSHOHOCKEN PENNSYLVANIA



Made for 120,000 lbs. Zinc



Made for 16,000 lbs. Zinc

NEW NEW NEW!

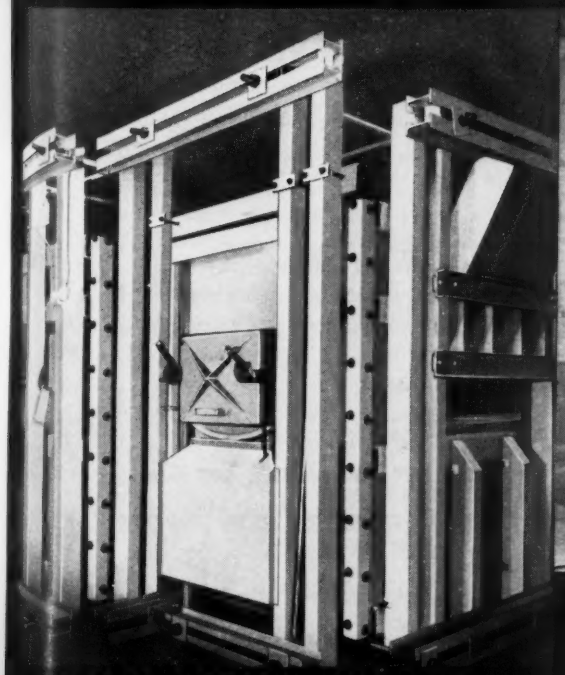
STROMAN NOW OFFERS A COMPLETE LINE OF REVERBERATORY FURNACES FOR THE MELTING OF . . .

ALUMINUM, ZINC, BRASS

Capacities are unlimited

These reverbs are built to assure heavy duty production for Smelting, Extrusion work, Die Casting, Permanent Molding and Foundry melting. Now in operation in some of the most prominent plants in the country they have proved their ability to deliver great volumes of metal that results in perfect castings, every time. They are easy to work with and around . . . operate most economically and are easy to maintain. Their efficiency and economy will amaze you and convince you of their superiority to any other furnace available. Why not write to-day for full information.

Made for 25,000 lbs. Aluminum



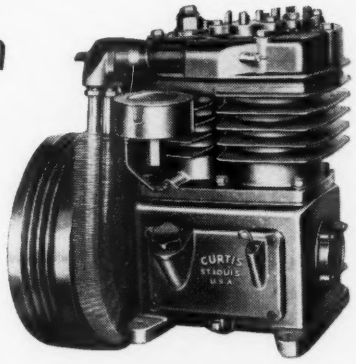
Made for 40,000 lbs. Aluminum

STROMAN FURNACE & ENGINEERING CO.
DIVISION OF
THE PETERSEN OVEN CO., FRANKLIN PARK, ILL.

Curtis

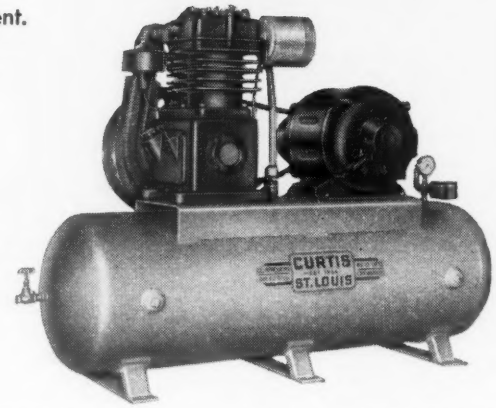
AIR COMPRESSORS, HOISTS and CYLINDERS

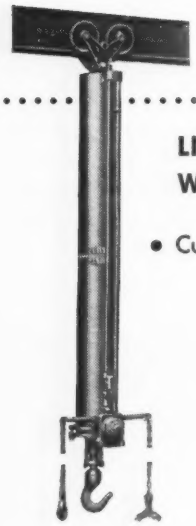
Cut Costs While Speeding Production



AIR TO DO INNUMERABLE JOBS AT LOWER COST WITH A PRECISION-BUILT CURTIS COMPRESSOR

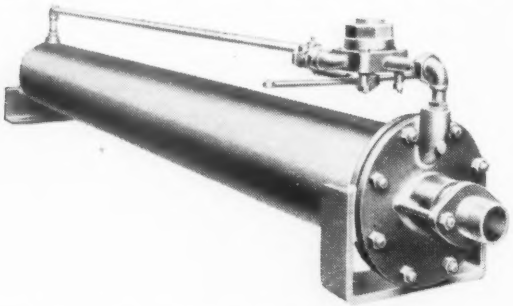
- Timken roller main bearings equipped—easy external adjustment.
- Self-oiling—pressure lubricated rod bearings and piston pins.
- Air-cooled—no danger of freeze-ups.
- Tank Mounted Compressors ¼ H.P. through 15 H.P. (up to 78 cu. ft. displacement per minute)
  Simple Compressors ¼ H.P. through 50 H.P. (up to 300 cu. ft. displacement per minute).





LIFT OR LOWER LOADS QUICKLY WITH A CURTIS "ALL STEEL" AIR HOIST

- Cut costs with these time-saving, work-saving air-powered hoists.



PUSH IT, PULL IT, LIFT IT, LOWER IT WITH A CURTIS "ALL STEEL" AIR CYLINDER

- Curtis Bracketed Air Cylinders can work in any position from horizontal to vertical.
- Delicate control of lifting and lowering speeds.
- Cylinders ground and polished on inside diameter.
- They bring new time-saving ease where lifting, lowering, pulling or pushing is required.
- Valve is disc type. Returns automatically to neutral position when operating chains are released . . . and effectively hold the load.

Get all the facts about cost-cutting Curtis equipment!

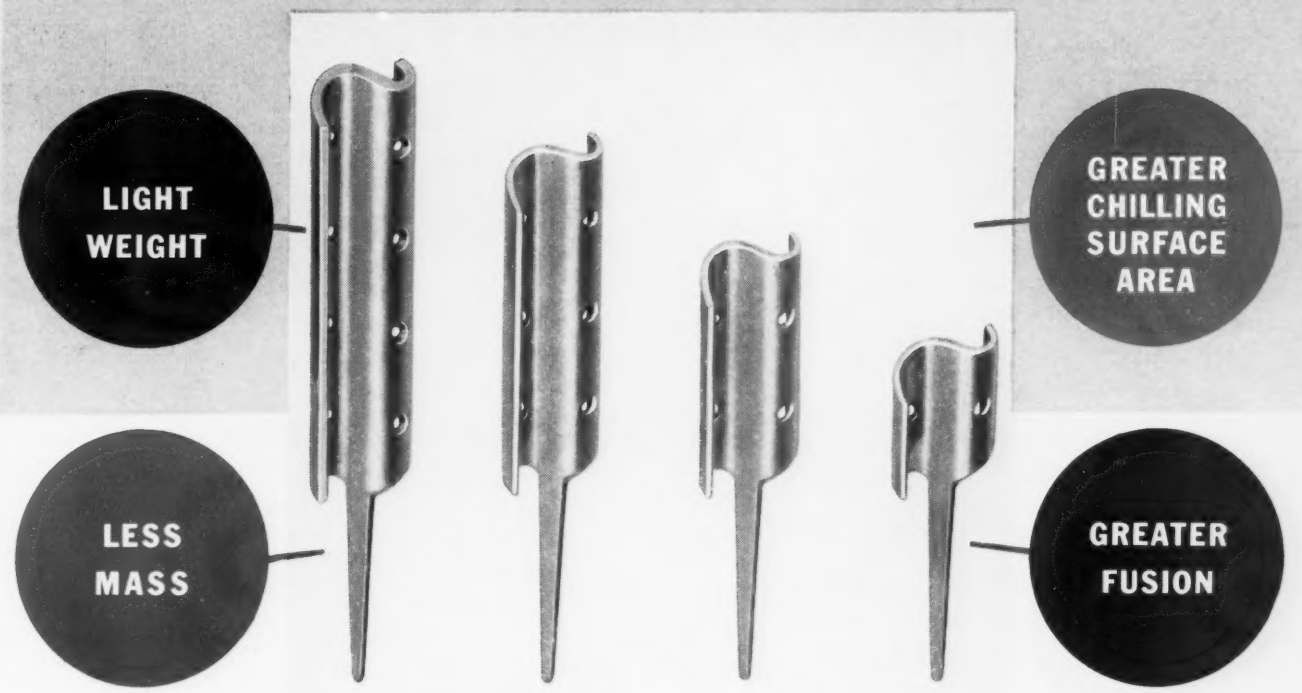
1854 **101** 1955 *years*

Curtis PNEUMATIC MACHINERY DIVISION
of Curtis Manufacturing Company
1922 Kienlen Avenue • St. Louis 20, Mo.

-806

Now fine FANNER FAN-S-CHILLS

for general chilling applications—light or heavy sections



Patent Pending

WITH THE EXCLUSIVE DESIGN

THAT PROVIDES FAR GREATER CHILLING *plus* EXTRA SAVINGS IN COST

Here is a fine FANNER Chill that is winning the praise of users everywhere throughout the industry. The Fan-S-Chill is another result of the continuous research and development that have produced so many other fine FANNER Chills.

The Fan-S-Chill, through its curved "S" design offers 75% more chilling surface with less weight since there is no solid mass. Moreover because of its curved "S" design and holes which permit more thorough flow of metal it fuses and locks into the cast metal solidly and completely. Since it is light in weight it offers savings in cost, shipping and handling. Made of formed steel, it is ideal for general chilling purposes, especially in steel.

You will be interested in the many cost saving features of the fine FANNER FAN-S-CHILL, so write today for samples and prices.

THE FANNER MANUFACTURING CO.

Designers and Manufacturers of Fine Fanner Chaplets and Chills

BROOKSIDE PARK CLEVELAND 9, OHIO

STANDARD SIZES

1/2" to 4" in length. 1-1/4" in width. Made in heavy, medium and light gauges. Copper, aluminum or tin coated.

•

Lighter or heavier FAN-S-CHILLS in special sizes can be made on request.

•

The Fanner Engineering Department will cooperate with you on special applications.

FOR EASIER... BETTER SAND CONTROL USE DELTA

SCIENTIFICALLY DEVELOPED FOUNDRY PRODUCTS

DELTA PERMI-BOND

SEA COAL REPLACEMENT IN MOLDING SAND

DELTA PERMI-BOND is a revolutionary development which eliminates the use of SEA COAL . . . and its inherent disadvantages . . . in molding sands.

It is a specially prepared pure hydrocarbon, completely volatile at elevated temperatures. It decomposes to form a vapor-gas cushion, which is reducing in nature, and leaves only a trace (two-tenths of 1% maximum) of ash.

NOTE THESE IMPORTANT ADVANTAGES . . . 1. Always uniform. 2. Eliminates sand contamination. 3. Greatly reduces gas, smoke, soot and dirt in the foundry. 4. Provides correct amount of vapor gas in the mold cavity to prevent casting blows. Allows use of lower permeability sand. 5. Increases dry strength of sand 75% to 90%. 6. Prevents scabbing, buckling, rat-tailing and cutting which greatly reduces scrap castings. 7. Improves casting finish, cuts cleaning room costs to a minimum. 8. More economical to use; reduces your sand costs. 9. Much cleaner and more foolproof to use than sea coal.

DELTA DRI-BOND

IN CORE SAND

DELTA DRI-BOND BINDER is a product of several years of research and experimentation in our own sand research laboratory and proved by additional years of actual experience-in-use data compiled by prominent foundries. The excellent results obtained with Delta Dri-Bond Binder, reported by all sources, establish beyond question both the outstanding superiority and greater economy of this new product for use in steel, gray iron and non-ferrous foundries.

In recent tests, conducted by impartial personnel, it was definitely proved that Delta Dri-Bond Binder has (a) — higher tensile and compression strength, (b) — much greater waterproofing properties and (c) — considerably higher green strength and hot strength than other dry binders tested.

DELTA SAND CONDITIONING OILS

FOR CORE AND MOLDING SANDS

DELTA SAND CONDITIONING OIL is a very fluid organic liquid with a light greenish color cast. It has a very low surface tension and acts as a lubricant in sand mixes. It improves the flowability and workability of both molding and core sand mixes. Its greatest use is in core sand mixes where, in addition to improving the flowability of the sand, it helps eliminate sand sticking to the core boxes.

It has proven exceptionally useful in the elimination of core sand sticking problems in plastic resin core sand mixes.

DELTA

Get the Facts . . . Working samples and complete literature on Delta Foundry Products will be sent to you on request for test purposes in your own foundry.

DELTA OIL PRODUCTS CO.

MANUFACTURERS OF SCIENTIFICALLY CONTROLLED FOUNDRY PRODUCTS

MILWAUKEE 9, WISCONSIN

QUANTOMETER CONTROL — ANOTHER

FACTOR IN EDCO ALUMINUM INGOT UNIFORMITY

Nearly everybody talks about personalized production and uniform quality. This photo of our Quantometer shows how EDCO achieves those prime requirements that you rightfully expect of a quality ingot supplier.

Whether your problem is finding the right *special* for your needs and getting it consistently . . . or simply a matter of getting a standard alloy consistently . . . you'll find it's good business to do business with EDCO.

CHRISTIANSEN CORPORATION

210 SOUTH MARION STREET • OAK PARK 1 (Chicago Suburb), ILLINOIS

EDCO DOWMETAL BOTTOM BOARDS • EDCO ALUMINUM INGOT

Soffel's

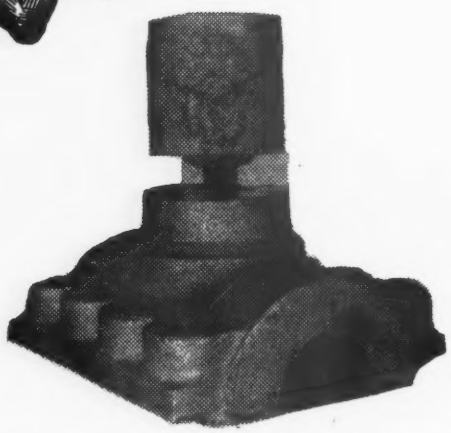
THERMOTOMIC® COMPOUND and CARBON FREE LIQUIDIZERS

Keeps Metal Molten!

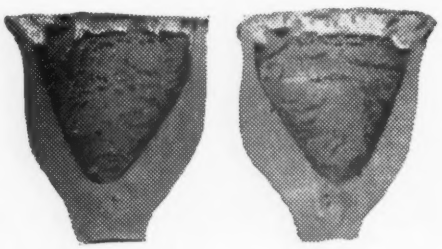
for Steel, Iron, Aluminum Brass, Bronze, Copper

THERMOTOMIC "X" is a patented exothermic compound that produces a temperature over 3500° F. It can be molded or baked into any desired shape the same as sand cores. THERMOTOMIC "X" is used as knock off core rings with 1½ inch feeder opening under risers of feeding heads, also as insulating sleeves, inserts and facings, or mixed with facing sand where it is desired to maintain fluidity of the casting metal. Shorter and more compact heads and risers can be used. The small feeder opening permits easy removal of feeding heads and risers. In conjunction with THERMOTOMIC COMPOUNDS, we recommend the use of exothermic CARBON FREE LIQUIDIZER NO. 5 on top of the metal in the heads or risers as an insulating cover. For green sand casting molds, use THERMOTOMIC WP (Waterproof).

U. S. Patents No. 2,490,327 and No. 2,500,097

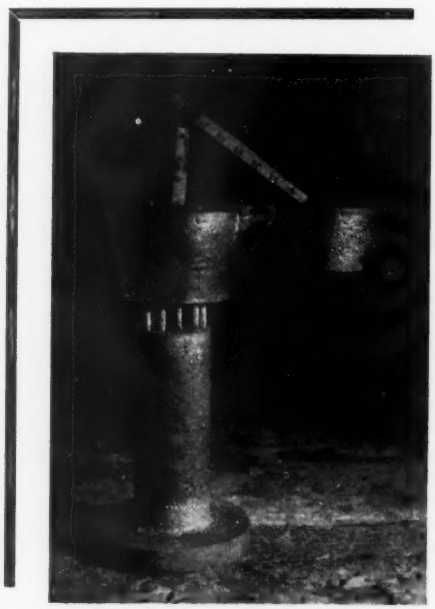


300 lb. aluminum bronze bearing cap cast with THERMOTOMIC feeding ring core under riser. Note small feeder opening which facilitates removal of riser from casting, resulting in greatly reduced cleaning costs.



NOTE THESE TYPICAL RESULTS FROM THE USE OF SOFFEL'S *Carbon Free* LIQUIDIZER

With the application of 1 pound of SOFFEL'S CARBON FREE LIQUIDIZER, this 6″ x 6″ chrome-nickel-steel riser was reduced in weight from 32 pounds to 13 pounds average. A savings of 19 pounds of salable metal, normally discarded as scrap, was fed into the casting and produced a heavier, sounder casting. Note the feeding head can be knocked off easily, saving burning costs. There is no better feeding head compound at any price than SOFFEL'S CARBON FREE LIQUIDIZER.



THERMOTOMIC *Strainer Core* PRODUCES MONEL CASTINGS 270 LBS. SOLID

Made by direct pouring through the Thermotomic strainer core under the feeding head.

No chills were used, no shrinkage at the flange. Note depth of shrinkage in the feeding head.

BEWARE OF IMITATIONS! We are the originators of CARBON FREE LIQUIDIZER and THERMOTOMIC COMPOUNDS

PITTSBURGH METALS PURIFYING COMPANY

1352 MARVISTA ST., N.S. PITTSBURGH 12, PA.

WORLD'S LARGEST MANUFACTURERS OF FLUXES AND PURIFIERS FOR ALL METALS AND ALLOYS

A Better Buy With Local Supply

—Genuine CLARK Parts

Your local Clark dealer provides service facilities that have been developed for your needs. You expect the best from your Clark trucks and your Clark dealer is there to see that you get it. You get a complete *service package* at your local Clark dealer.

LARGEST SUPPLY—Your local Clark dealer's parts inventory is based on machine population. You get mobile service for emergencies . . . for preventative maintenance at your plant.

QUALITY PARTS—Your source for Genuine Clark parts. Designed specifically for your equipment . . . engineered to outlast, outperform any substitutes.

ONE SOURCE—for quality rebuilding, maintenance, parts, and mobile service. Complete, modern facilities offer the best in service . . . at lowest cost.

FACTORY TRAINED MECHANICS—use specially designed tools and test equipment . . . know your equipment best.

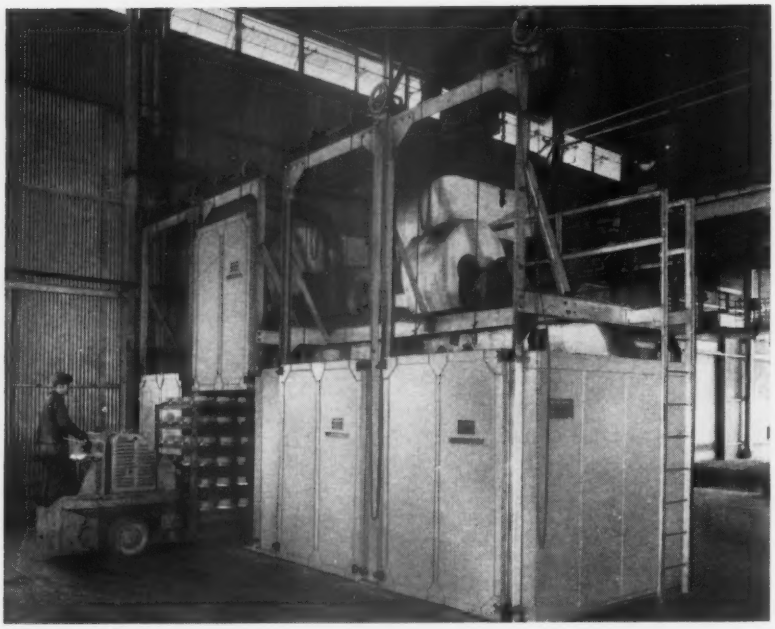
CLARK EQUIPMENT

Industrial Truck Division
CLARK EQUIPMENT COMPANY
Battle Creek 16, Michigan

A BETTER BUY WITH LOCAL SUPPLY—GENUINE CLARK PARTS

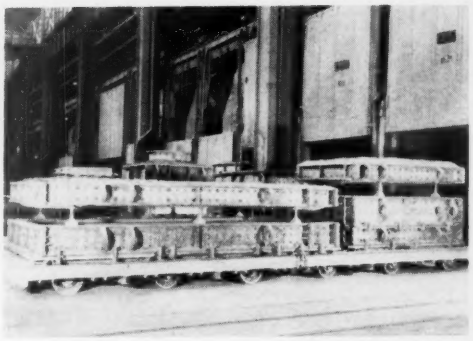
Lower foundry costs begin with...

COLEMAN OVENS

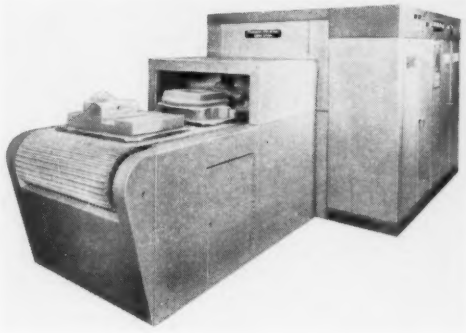


Coleman Transrack Ovens

Coleman Tower® Oven



Coleman Car Type Mold Ovens



Coleman Dielectric Oven

The principal way of cutting costs in your coreroom is to get correctly baked cores and properly dried molds every time! Otherwise the efficiency of your core or mold making equipment, the skill of your labor and the best materials are wasted!

To reduce casting scrap, to save on labor, fuel and material, to produce consistently good castings, you need the best core baking and mold drying ovens available—Coleman!

Coleman Core and Mold Ovens are as fine as modern engineering and *more than a half a century* of specialized foundry experience can make them. Users are amazed at the improvement Coleman Ovens provide in uniform heating, accurate control, efficient work handling and dependable performance.

With production savings so important to profits, it will pay you to investigate the unusual advantages of Coleman Ovens now! *As builders of the world's only complete line of foundry ovens, we have no reason to recommend any but the best oven suited to your purpose.* For better castings at lower cost let our experienced Engineers give you practical recommendations for your particular requirements.

WRITE FOR BULLETIN 54

A COMPLETE RANGE OF TYPES AND SIZES...

for every core baking and mold drying requirement:

Tower Ovens • Horizontal Conveyor Ovens
Car-Type Core Ovens • Car-Type Mold Ovens
Transrack Ovens • Rolling Drawer Ovens
Portable Core Ovens • Portable Mold Dryers
Dielectric Core Ovens

MEMBER FEMA

THE FOUNDRY EQUIPMENT COMPANY
1821 COLUMBUS ROAD **CLEVELAND 13, OHIO**

WORLD'S OLDEST AND LARGEST FOUNDRY OVEN SPECIALISTS

Miller AIR CYLINDERS

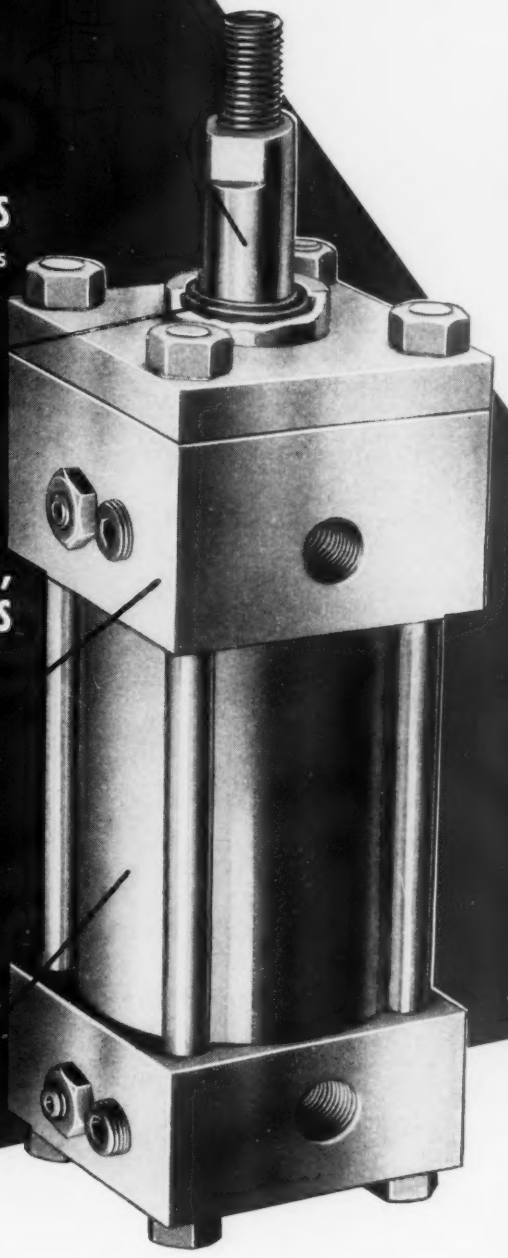
Ideal For Toughest Foundry Service!

IARD
HROME PLATED
ISTON RODS
revent Scratch-Damage,
licks and Rust

IRT WIPER SEALS
rotect Rods, Seals, Bushings

OLID STEEL HEADS,
APS and MOUNTINGS
liminate Breakage

RASS BARRELS
liminate Rust and Corrosion



Miller Standard Air Cylinders are so soundly designed and sturdily constructed that, even under the severe abrasive conditions of foundry service, they provide extremely long life without requiring packing replacement or other maintenance.

They are offered in a complete line of "custom-built" units available on normal scheduled delivery in *thousands* of combinations of bore, stroke and mounting to meet every foundry need.

They feature the SPACE-SAVING SQUARE DESIGN originated by Miller in 1945 and fully met the J. I. C. Pneumatic Standards years before their adoption in 1950.

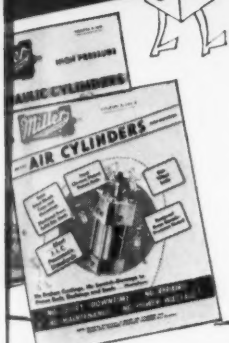
Immediate Delivery From "Stock"

Rapidly expanding list of Miller "Stock" Cylinders for *immediate, off-the-shelf delivery* now includes *thousands* of different combinations of bore, stroke and model and covers both air and hydraulic cylinders—cushioned and non-cushioned.

These are in addition to Miller "Custom-Built" Cylinders available on normal scheduled delivery in an almost infinite selection.

"Stock" Boosters also available for immediate delivery.

Write for Complete Catalog and Stock List!



WRITE FOR CYLINDER BULLETINS A-105 and H-104

Complete Miller cylinder line includes: air cylinders, 1½" to 20" bores, 200 PSI operation; low pressure hydraulic cylinders, 1½" to 6" bores for 500 PSI operation, 8" to 14" bores for 250 PSI; high pressure hydraulic cylinders, 1½" to 12" bores, 2000-3000 PSI operation. All mounting styles available.

SALES AND SERVICE FROM COAST TO COAST

EVELAND • YOUNGSTOWN • DAYTON • PITTSBURGH • PHILADELPHIA • STON • HARTFORD • NEW YORK CITY • BUFFALO • ST. PAUL • GRAND PIDS • DETROIT • FLINT • FORT WAYNE • SOUTH BEND • INDIANAPOLIS MILWAUKEE • LOUISVILLE • KANSAS CITY • SEATTLE • LOS ANGELES • N FRANCISCO • BALTIMORE • DENVER • ST. LOUIS • MOLINE • CHICAGO HOUSTON • TORONTO, CANADA and OTHER AREAS

MILLER FLUID POWER CO.
(Formerly MILLER MOTOR COMPANY*)*

2034 N. HAWTHORNE AVE., MELROSE PARK, ILL.

AIR & HYDRAULIC CYLINDERS • BOOSTERS • ACCUMULATORS
COUNTERBALANCE CYLINDERS

"NEW HORIZONS"

"Metallurgical research has made new discoveries on the importance of carbon in the atomic assembly in metals."

"Alloy Metal Abrasive Company has maintained a continuous program of development in metals for the resistance to impact and other qualities for peening and cleaning operations and has been, and is, a prime mover in the development and production of quality products for all blastcleaning and peening operations."

"Alloy Metal's products are produced in the specifications as required to meet SAE and production standards, and these products are available to industrial consumers who are interested in precision operations and in the reduction of operating costs."

ALLOY METAL ABRASIVE CO.

121 South Division Street, Ann Arbor, Michigan

Head of the Class

the superb grain structure of

GLOBE SILVERY

assures top performance

This unretouched photograph showing the uniform grain structure speaks for itself. It's the result of more than 80 years leadership in the research and development of Silvery Pig Iron. Globe produces all grades of Virgin Ore Silvery Pig Iron and Electric Furnace Ferro-Silicons.

Foundry operators consistently achieve better castings at less cost with Globe Silvery. It produces a high-strength iron with high-steel mixes and is an excellent softener for thin-section work where softness and machinability are required.

SILVERY PIG and FERRO-SILICONS
GLOBE
SINCE 1872

globe iron company

For further information we invite you to contact our Sales and Metallurgical Department . . .

Home Office: **JACKSON, OHIO**

SOME SCHNEIBLE "FIRSTS"
1935–1955

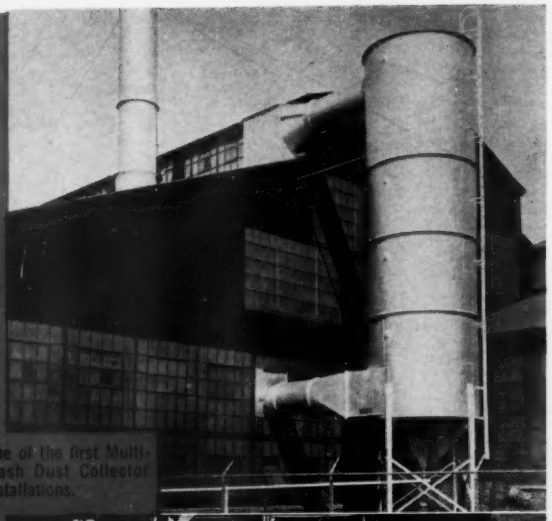
20 years
OF PROGRESS

IN

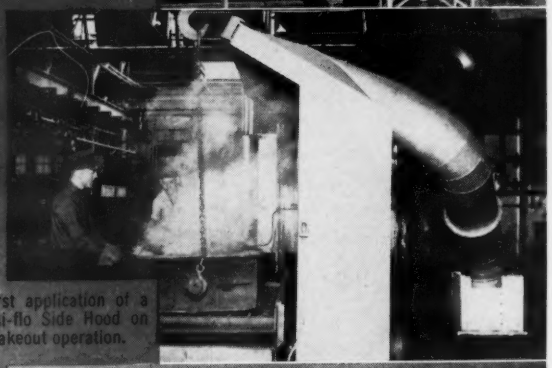
FOUNDRY DUST COLLECTION, VENTILATION

AND

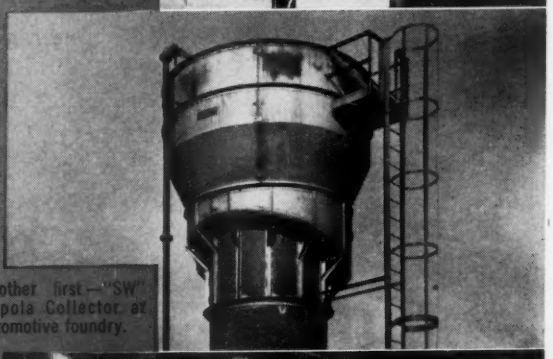
AIR POLLUTION CONTROL



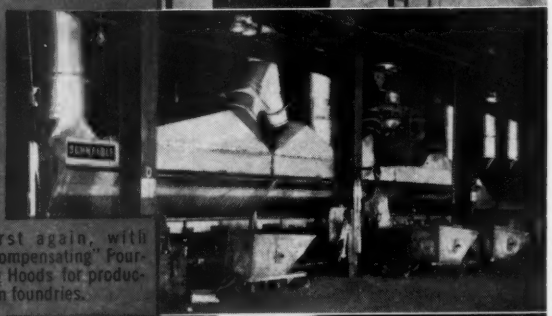
1935 One of the first Multi-Wash Dust Collector installations.



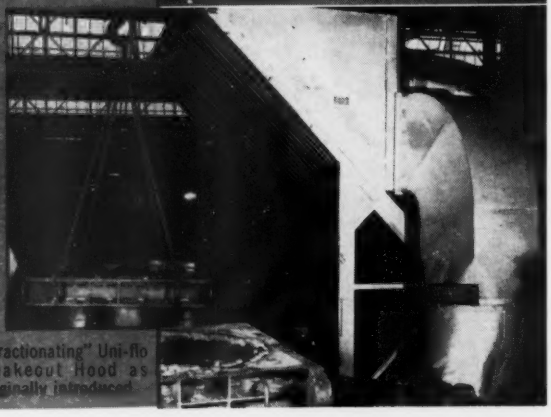
1938 First application of a Uni-flo Side Hood on shakeout operation.



1941 Another first—"SW" Cupola Collector at automotive foundry.



1947 First again, with "Compensating" Pouring Hoods for production foundries.



1948 "Fractionating" Uni-flo Shakeout Hood as originally introduced.

SCHNEIBLE DUST CONTROL APPLICATIONS

Shakeout, Sand Preparation, Casting Cleaning, Grinding, Cupola Exhaust, Core Making, Pouring Stations, Mold Cooling, Furnace Exhaust

SCHNEIBLE EQUIPPED FOUNDRIES

Grey Iron Foundries, large and small; Malleable Iron Foundries, large and small; Steel Foundries; Aluminum Foundries; Brass and Bronze Foundries; Magnesium Foundries

All Schneible Equipment is covered by patents in United States and foreign countries.

SCHNEIBLE

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

CLAUDE B. SCHNEIBLE COMPANY

P. O. Box 81, North End Station • Detroit 2, Michigan

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LATE NEWS

FEBRUARY 24 1955

PROBLEM IN ALUMINUM: Producers and consumers of secondary aluminum ingot are unhappy about the pinch in scrap supplies. Smelters are forced to pay relatively high prices for what scrap is available and say they have not been able to offset the increase through advances in ingot prices. Exporters are topping bids of smelters for scrap; in fact, recent exports of 3000 tons or more monthly of aluminum scrap are described as the straw that broke the camel's back in attempts to attain balance between supply and demand.

For some time foundries generally have had small inventories of ingots and have been hurt by the price rise and limited supply. Record-breaking production of primary metal offers little help to the secondary market because government stockpile requirements and heavy demand for aluminum sheets, extrusions, etc. are absorbing the increased output.

U. S. production of primary aluminum during January set an all-time monthly record of 128,200 tons, according to the Aluminum Association. This continues the record pace set in 1954 when the year's production was more than 1,460,000 tons, against 1,252,000 tons in 1953. Last year's fourth quarter total of 373,000 tons also set a record.

NONFERROUS FOUNDERS: Annual meeting of the Non-Ferrous Founders' Society will be held at the Congress Hotel, Chicago, on Saturday, May 21. A business meeting will be held in the morning; an outstanding speaker will address a luncheon session, followed by an afternoon meeting. The annual dinner will be held Saturday evening. Society directors will meet on Friday, May 20.

EQUIPMENT MERGER: Mackintosh-Hemphill Co., Pittsburgh, will be acquired by the E. W. Bliss Co., Canton, O., subject to approval by the former's stockholders of a proposal made by the Bliss company. Mackintosh-Hemphill, whose history goes back more than 150 years, would operate as a division of E. W. Bliss in the production of iron and steel rolls and as a builder of steel mill equipment. Bliss, builder of presses, rolling mill equipment, can making machinery and diemaker's supplies, has gray iron foundries in Toledo, O., and Hastings, Mich.

FERROUS SCRAP: Consumers of iron and steel scrap will have an opportunity on Mar. 1 to speak their piece on the ferrous scrap export situation. The Department of Commerce has called a Washington meeting of the ten-man industry advisory task force on that date. The licensing arrangement now governing scrap exports expires Mar. 31, and both steel mills and foundries are expected to urge some revision that will slow down the rising flow of scrap from this country. January exports were 275,000 tons; this annual rate of 3,300,000 tons compares with 1954 shipments of 1,300,000 tons and the 1953 total of only 271,000 tons.

Foundry representatives on the scrap advisory committee are F. H. Hanfelder, American Steel Foundries, Chicago, and Irving M. Lynn, Lynchburg Foundry Co., Lynchburg, Va.

MARKETING CONFERENCE: Malleable Founders' Society is planning its annual Market Development Conference to be held at the Edgewater Beach Hotel, Chicago, Apr. 7-8. Topics to be discussed include the outlook for malleable iron castings in the metalworking field, ways to create markets, and selling methods. The conference is sponsored by the society's Market Development Committee.

MOVING OUT: United Engineering & Foundry Co. is moving out of the New Castle, Pa., foundry, machine shop and forging plant it built for the government in 1942. It has occupied the plant since then under lease. The plant employed 2000 persons at its wartime peak.

PERSONALS: Edwin E. Pollard, recently vice president in charge of operations, Caldwell Foundry & Machine Co., Birmingham, has joined Tyler Pipe & Foundry Co., Tyler, Tex. . . . Roy C. Hobson, assistant manager, National Malleable & Steel Castings Co.'s Chicago plant, has been made manager, and Allan S. Bixby has been promoted from assistant manager of the Melrose Park, Ill., plant to manager

. . . Warner B. Bishop Jr., sales manager of the Foundry Products Division, Archer-Daniels-Midland Co., Cleveland, has been elected an assistant vice president of ADM . . . Frank S. Brewster is leaving Harry W. Dietert Co., Detroit, where he has been vice president and general manager, to join the South Gate Aluminum & Magnesium Co., South Gate, Calif. . . . Stephen D. Moxley has been elected president of American Cast Iron Pipe Co., Birmingham, where he had been executive vice president . . . Aaron E. Hess, formerly vice president and sales manager, Lancaster Malleable Castings Co., Lancaster, Pa., has been elected vice president and general manager, and Richard G. Hess has been named vice president and sales manager.

LEAVES SOCIETY: A. A. Hilbron, for some years convention and exhibits manager of the American Foundrymen's Society, has joined the Morrison Hotel, Chicago, as assistant director of conventions and sales.

LIGHT METALS DIRECTOR: Harold C. Erskine has been appointed director of the Aluminum and Magnesium Division, Business and Defense Services Administration, Washington. Mr. Erskine is on loan from the Aluminum Co. of America, Pittsburgh, where he is assistant general manager of its Castings Division. He was formerly Cleveland works manager and later assistant manager of the Alcoa Die Casting Division.

OBITUARY: Thomas S. Quinn, 67, co-founder and treasurer of Lebanon Steel Foundry, Lebanon, Pa., died Feb. 20 . . . Frank M. Klump, 81, for many years superintendent, National Malleable & Steel Castings Co., Cleveland, and until recently operator of a brass foundry in Detroit, died Feb. 18.

MISCELLANY: Detroit Gray Iron Foundry Co., Detroit, suffered damage estimated at $75,000 Feb. 15 from a fire started when sparks from a welder's torch fell into some exothermic material . . . West Steel Casting Co., Cleveland, has an order for 13,200 steel buffer castings and miscellaneous castings to be used on 1650 freight cars the Magor Car Corp., Clifton, N. J., is to build for India . . . Plant of Bell City Foundry, Brantford, Ont., Canada, had fire damage of more than $125,000, Feb. 8.

PRICES OF FOUNDRY METALS AND COKE

(As of Feb. 24, 1955)

FOUNDRY COKE

(Per net ton, f.o.b. ovens)

BEEHIVE

Connellsville	$16.50–17.00

OVEN

Birmingham	$22.65
Buffalo	25.00
Chicago	24.50
Detroit	25.50
Erie, Pa.	25.00
Everett, Mass.	23.50
Indianapolis	24.25
Kearny, N. J.	24.00
Lone Star, Tex.	18.50
Milwaukee	25.25
Montreal, Que.	26.25
Painesville, O.	25.50
Philadelphia	23.00
Portsmouth, O.	24.00
St. Louis, del.	26.00
St. Paul	23.75
Swedeland, Pa.	23.00
Terre Haute, Ind.	24.05

PIG IRON

(Per gross ton f.o.b. furnace)

	No. 2 Foundry	Malleable
Bethlehem, Pa.	$58.50	$59.00
Birmingham	52.88	....
Buffalo	56.50	57.00
Chicago	56.50	56.50
Cleveland	56.50	56.50
Duluth	56.50	56.50
Erie, Pa.	56.50	56.50
Everett, Mass.	61.00	61.50
Fontana, Calif.	62.50	....
Geneva, Utah	56.50	....
Granite City, Ill.	58.40	58.90
Lone Star, Tex.	52.50	52.50
Neville Island (Pittsburgh)	56.50	56.50
Steelton, Pa.	58.50	59.00
Swedeland, Pa.	58.50	59.00
Toledo, O.	56.50	56.50
Troy, N. Y.	58.50	59.00
Youngstown, O.	....	56.50

NONFERROUS INGOT

(Cents per pound, carlots)

BRASS AND BRONZE: Red brass, No. 115, 33.00; tin bronze, No. 225, 43.50; No. 245, 37.75; high-leaded tin bronze, No. 305, 37.00; No. 1 yellow, No. 405, 28.75; manganese bronze, No. 421, 30.75.

ALUMINUM: 99 per cent plus, primary ingots 23.2. Secondary No. 12 alloy 26.50-28.00. Deoxidizing grades: No. 1 28.00-29.50; No. 4 26.00-27.00.

MAGNESIUM: 99.8 per cent notched ingots 27.75, f.o.b. Freeport, Tex. (10,000 lb or more).

COPPER: Electrolytic 33.00, delivered Connecticut valley.

ZINC: High grade 12.85, delivered. Die casting alloy 15.50, delivered.

IRON AND STEEL SCRAP

(Consumer prices per gross ton delivered, except as otherwise noted)

	No. 1 Heavy Melting Steel	No. 1 Cupola Cast	Heavy Breakable Cast	Clean Auto Cast	Machinery Cast	Malleable	Short Steel Rails
Birmingham	$30.00–31.00	**$45.00–46.00	.....	.....	.....	.....	$42.00–43.00
Boston*	**27.00–28.00	**30.00–31.00	.....	.....	**33.00–34.00	.....	.....
Buffalo	32.00–33.00	**36.00–37.00	.....	.....	**41.00–42.00	.....	42.00–43.00
Chicago	33.00–35.00	39.00–41.00	.....	44.00–45.00	44.00–45.00	44.00–45.00	47.00–49.00
Cincinnati*	**31.50–32.50	**39.00	**35.00	.....	**45.00	.....	**47.00–48.00
Cleveland	33.50–34.50	45.00–46.00	34.00–35.00	46.00–47.00	46.00–47.00	44.00–45.00	50.00–52.00
Detroit*	**28.50	**34.00	**25.00	**38.00	.....	**30.00	.....
Los Angeles	28.00	**42.00–44.00	.....	.....	.....	.....	.....
New York*	33.00–34.00	29.00–30.00	.....	.....	.....	.....	.....
Philadelphia	39.50	35.00–37.00	38.50–39.00	.....	44.00	44.00	.....
Pittsburgh	38.00–39.00	38.00–39.00	32.00–33.00	.....	43.00–44.00	.....	49.00–51.00
St. Louis*	31.00	40.00	32.50	42.50	.....	.....	46.00
San Francisco	24.00	40.00	36.00	39.00	48.00	.....	.....
Seattle	29.00	**35.00–40.00	**23.00	.....	.....	.....	.....

*Brokers' buying prices. **F.o.b. shipping point.

Whitehead's
FINE SILICA SANDS
for Fine Finish Castings and Shell Molding

Whitehead offers the widest variety of fine washed and unwashed silica sands . . . all laboratory-tested in a Whitehead laboratory in each of the areas represented.

DIVIDING CREEK, New Jersey
Fine Washed Silica Sands

Retained on Sieve #	Grade D #71	Grade D Special #75	Grade E #96	Grade Overflow #118	Grade Superior #158
30	none	none	none	none	none
40	2.0	1.0	1.0	.2	.2
50	9.8	4.8	7.6	3.2	1.8
70	26.4	14.0	20.4	13.2	4.6
100	41.0	40.2	31.8	29.0	11.2
140	15.0	29.8	17.2	20.2	22.4
200	4.4	8.2	10.8	15.4	25.6
270	.8	1.2	5.6	8.8	14.0
Pan	.6	.8	5.6	10.0	20.2

McCONNELLSVILLE, New York
Fine Unwashed Silica Sands

Retained on Sieve #	#103	#130	#155	#180	#230	#275
30	.3	.2	none	none	none	none
40	.5	.2	.4	"	"	"
50	4.2	.4	1.4	"	.2	"
70	13.6	1.6	3.2	.4	.2	.2
100	26.1	12.4	10.2	2.5	.4	.6
140	25.7	32.8	22.0	18.0	4.0	1.2
200	20.8	37.2	30.0	35.9	21.4	6.4
270	5.5	9.8	14.2	17.4	21.4	11.2
Pan	3.3	5.4	16.8	23.8	46.4	80.4
Very Fine	none	none	1.8	2.0	6.0	

NEW ENGLAND
Marion Fine Washed Silica Sand AFSF #105

Sieve #	Retained
+6	none
12	"
20	"
30	"
40	.6
50	1.4
70	6.0
100	30.6
140	34.4
200	19.2
270	4.6
Pan	3.2

LEADER IN FOUNDRY SANDS SINCE 1841

Whitehead Brothers COMPANY

Established 1841

NEW YORK OFFICE
324 West 23rd St., New York 11, N. Y.

NEW ENGLAND OFFICE
17 Exchange Place, Providence 1, R. I.

Manufacturers of:

LYQUAGRIP
Ready-to-use core paste

DOB-IT
Ready-to-use core mudding compound

JOINT-SEAL
Plastic compound for perfect sealing

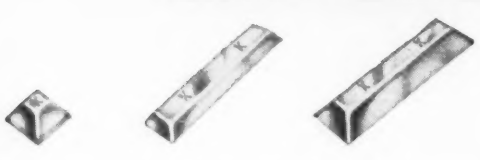
LYQUAFLOUR
For cleaner surface, better shakeout

LYQUAFACE
The liquid sand grain coating

SITUATION UNDER CONTROL BY KEOKUK

CHIEF KEOKUK:
"Little Chief say old way get smoke signals crossed He cut letters in blankets!"
PRINCESS WENATCHEE:
"As usual he has the situation well under control!"
dickstone

KEOKUK **K**



. Keokuk Silvery . . . the superior form of silicon introduction for steel plants and foundries . . . available in 60 and 30 lb. pigs and 12½ lb. piglets . . . in regular or alloy analysis. Keokuk also manufactures high silicon metal.

ELECTRO-METALS COMPANY

KEOKUK, IOWA

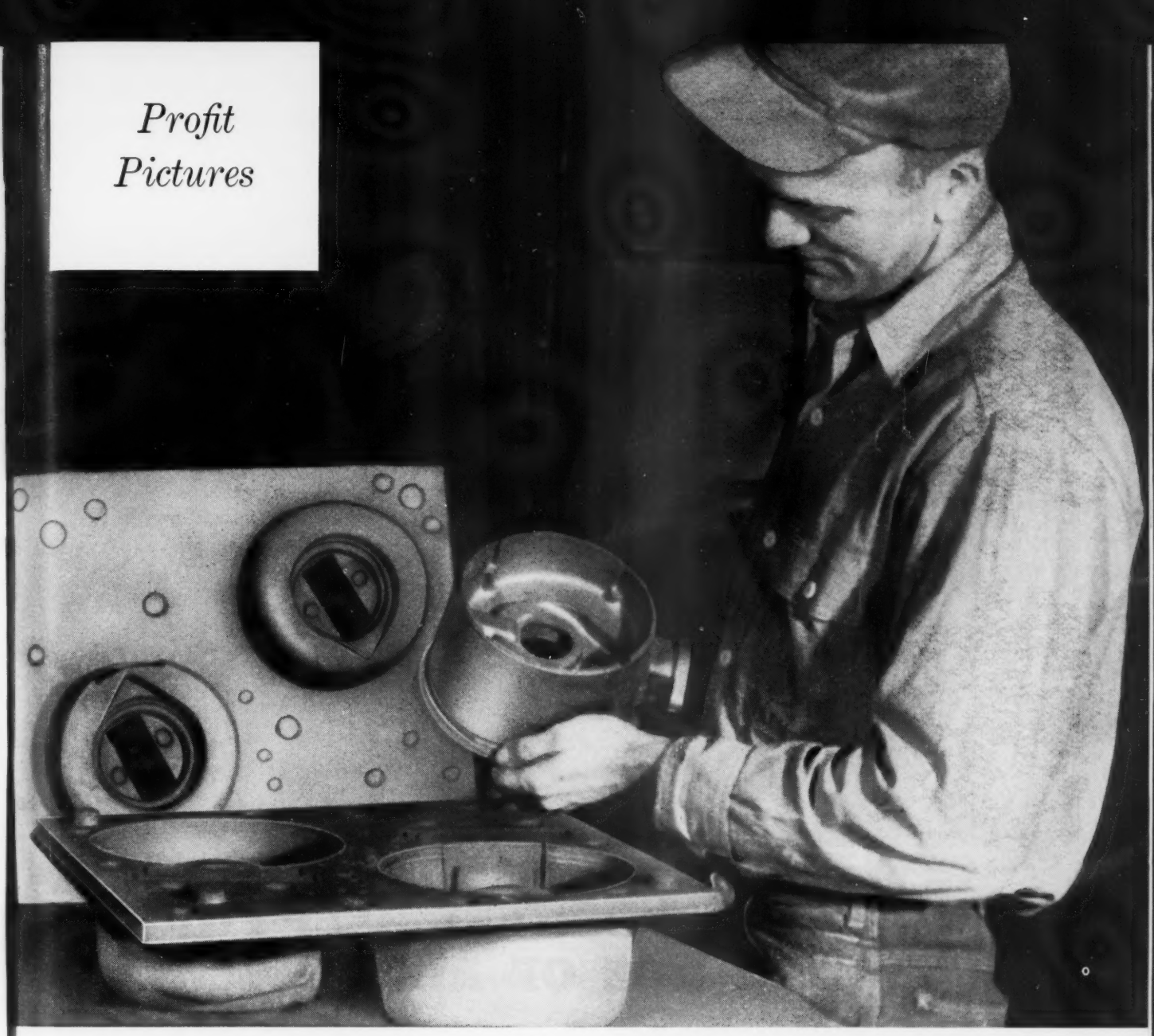
WENATCHEE DIVISION, WENATCHEE, WASHINGTON

Smoke out high costs and control quality with Keokuk Silvery Pig Iron! Keokuk assures less waste and exact control of the melt through uniform silicon distribution. Car for car, pig for pig, its uniformity *never* varies. Charge Keokuk by magnet or count.

SALES AGENT: MILLER AND COMPANY

332 S. Michigan Ave., Chicago 4, Illinois
3504 Carew Tower, Cincinnati 2, Ohio
8230 Forsyth Blvd., St. Louis 24, Missouri

Profit Pictures



Foundryman inspects smooth finish of 8-lb. housing for Hotpoint Disposall* as part is taken from shell mold bonded with Resinox 736.

Leading gray iron foundry gets stronger molds using **Resinox 736!**

Shell molding pioneer selects Monsanto phenolic resin for its outstanding performance

"Much of the credit for our successful shell molding of garbage disposal housings must go to Resinox 736," according to Wayne Wright, shell molding engineer for Woodruff & Edwards, Elgin, Illinois.

"We have used other resins extensively in our plant and are now convinced that Resinox 736 provides a stronger mold. There is perfect uniformity in each batch we order."

The housings, made for the famous Hotpoint Disposall, were originally die cast and consisted of two separate parts. Now that the housing is shell molded, it consists of a single unit that is lighter in weight and less expensive to produce.

There is a further saving because far less cleaning and machine finishing are now necessary.

The Woodruff & Edwards project is only one of a long line of outstanding shell molding jobs in which Monsanto resins are being used.

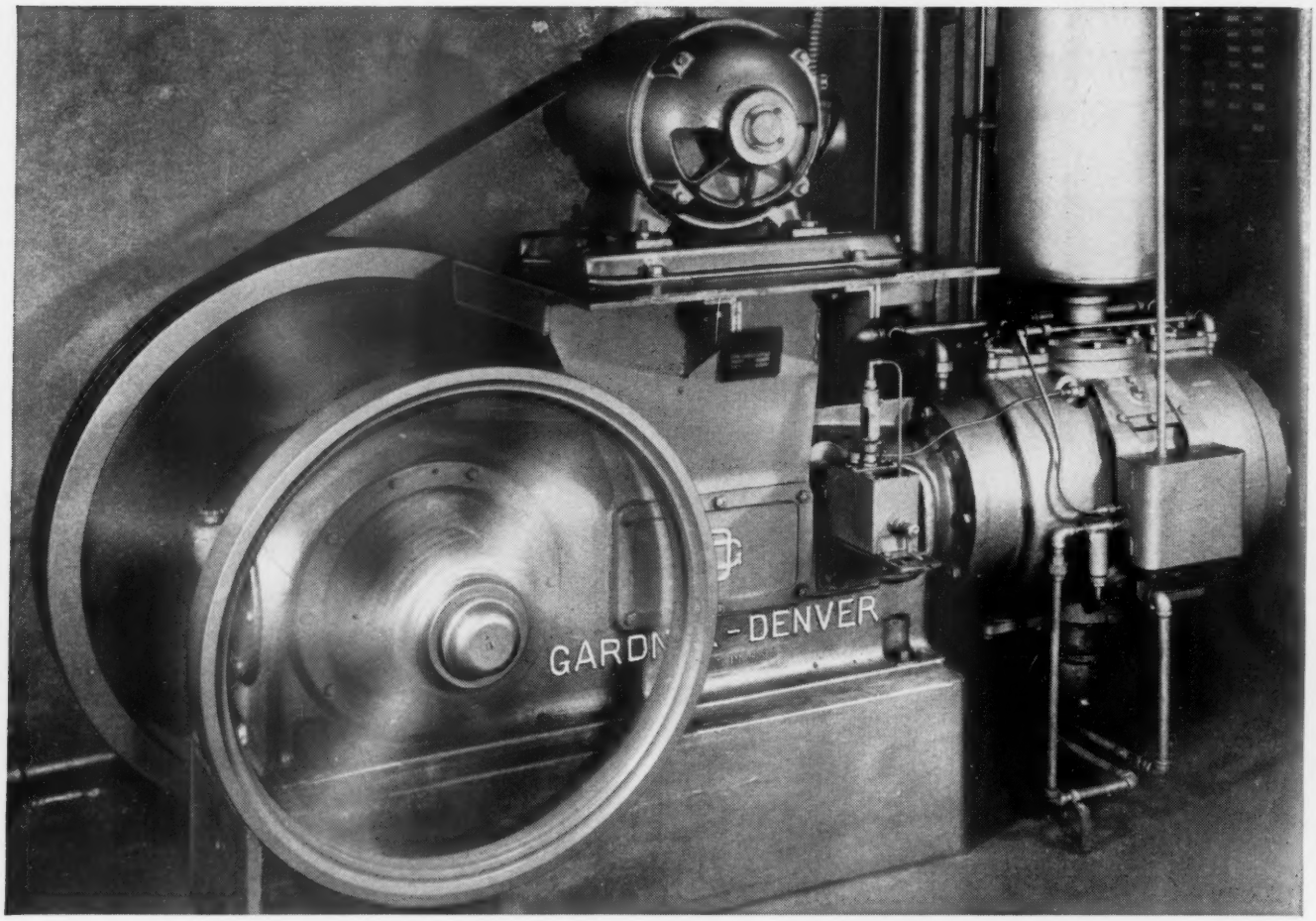
For shell molding, core binding or sand conditioning resins that are research-developed and shop-tested to meet *your* foundry needs, write first to Monsanto Chemical Company, Plastics Division, Springfield 2, Mass.

For stronger shell molds, specify

RESINOX®

MONSANTO

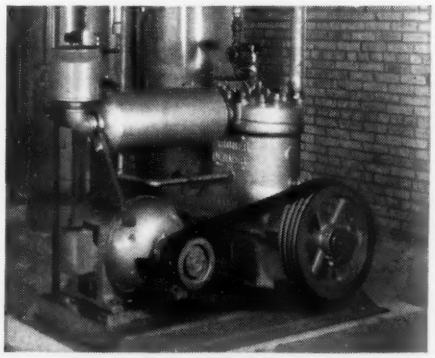
*Disposall is a registered trade-mark of Hotpoint Co.



Model RX — 89 to 1292 c.f.m. Bulletin HAC-40.

MORE GARDNER-DENVER HELP FOR YOU IN THIS AGE OF AIR POWER

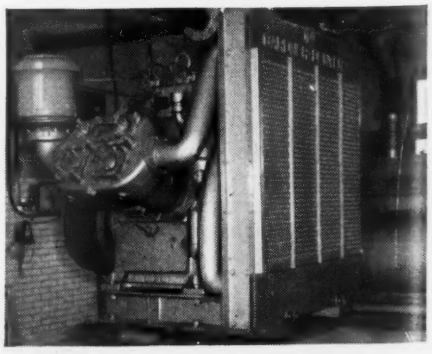
Model AA — 32 to 183.6 c.f.m. Bulletin AA-6.



* Expert help in choosing the right size and type air compressor for your plant.
* Pointers on compressor care and maintenance to help you obtain the full efficiency of Gardner-Denver quality.
* Application suggestions for utilizing low-cost air power from Gardner-Denver compressors.

GARDNER-DENVER Since 1859 — KELLER TOOLS

Model WB-142 to 686 c.f.m Bulletin WB-10.



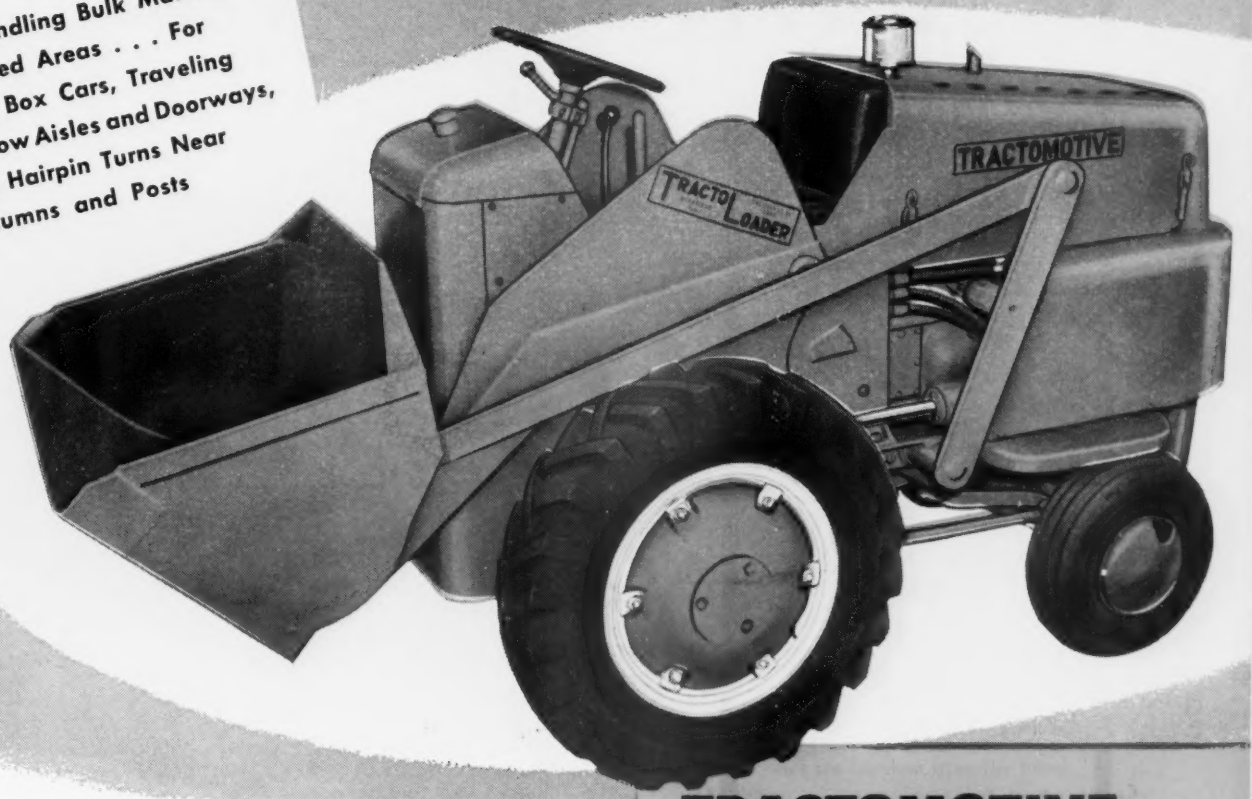
GARDNER-DENVER

THE QUALITY LEADER IN COMPRESSORS, PUMPS AND ROCK DRILLS FOR CONSTRUCTION, MINING, PETROLEUM AND GENERAL INDUSTRY

Gardner-Denver Company, Quincy, Illinois
In Canada: Gardner-Denver Company (Canada), Ltd.,
14 Curity Avenue, Toronto 16, Ontario

Now! a Compact TRACTO LOADER for Close-Quarter Work

Ideal For Handling Bulk Material in Confined Areas . . . For Unloading Box Cars, Traveling Through Narrow Aisles and Doorways, Making Hairpin Turns Near Columns and Posts



TRACTOMOTIVE TL-6 TRACTO LOADER

BUCKET CAPACITY: ½ cu yd
BRAKE HP: 33.7
SPEEDS: 2 forward; up to 10 mph
2 reverse; up to 20 mph
WEIGHT: 6,000 lb

Has Short 6½-ft Turning Radius . . . Over-all Length only 9 ft, 7 in., Width 4 ft, 5 in. . . . Plus Other Outstanding Performance and Service Features

Tip-Back Bucket Gets and Carries Bigger Loads 22° tip-back of bucket at ground level gives you "scooping action" for fast, full loading. You also save time getting away with load, hold spillage to a minimum, because bucket tips back quickly to a 50° carry angle at only 3 ft above ground. Low carrying position plus greater tip-back moves load center closer to tractor for better over-all balance.

Torque Converter Drive Works Smoother, Easier . . . crowds steadily into the pile, eliminates most shifting, engine stalling and wheel spinning . . . greatly reduces tire wear. Tractor's weight plus large drive wheels enables the TL-6 to take advantage of the high, three-to-one torque ratio.

Clutch-Type Transmission Speeds Work Cycle You simply push a single lever to go forward; pull it back for reverse. Reverse is twice as fast as forward to assure the fastest possible work cycles.

Built for Long, Hard Service — filters in hydraulic system and transmission . . . replaceable hardened pins and bushings. All maintenance points easily accessible. Lift and dump cylinders are located well above floor for extra protection from dust.

• • •

Ask your Allis-Chalmers Industrial Tractor Dealer to show you the TL-6 in action. See how Tracto-Loader design can speed your operation.

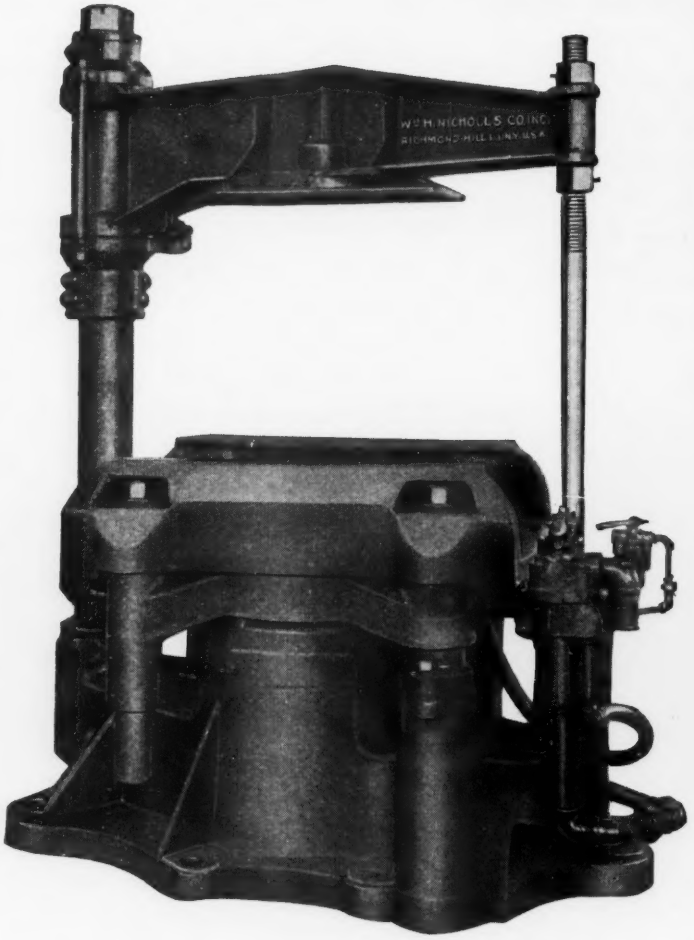
Sold and Serviced by your Allis-Chalmers Industrial Tractor Dealer

TRACTOMOTIVE

TRACTOMOTIVE CORPORATION
Deerfield, Illinois

Tracto-Loaders • Tracto-Shovels • Side Booms and Hydraulic Rippers for Allis-Chalmers Crawler Tractors • Loader and Shoulder Maintainer for Allis-Chalmers "D" Motor Grader.

You Know You Can Rely on



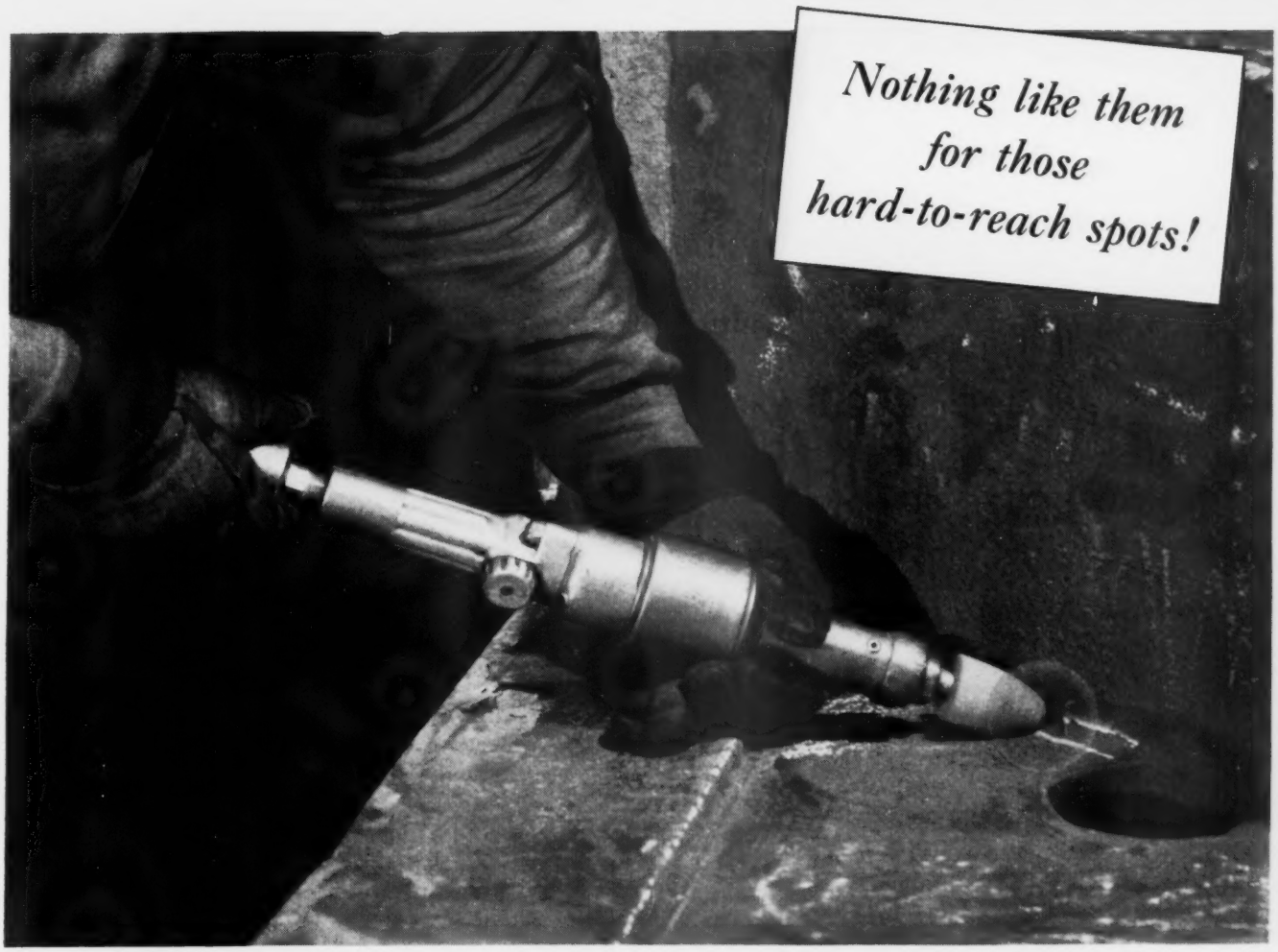
NICHOLLS HEAVY DUTY MOLDING MACHINES

Nicholls Molding Machines are designed for *heavy duty*, scientifically built to produce one good mold after another. Result: you meet rigid production schedules, give your customers better service, better goods.

Nicholls manufacturers a complete line of portable and stationary molding machines for the output of light, medium and heavy castings. Each can be furnished with electric controls for push-button, fully-automatic operation.

Wm. H. Nicholls Co., Inc., Richmond Hill 12, Long Island, N. Y.

NICHOLLS



Additional "Touch of Gold" Advantages brought by K Bond CRYSTOLON* cones are freedom from the usual grooving and chipping of vitrified cones on gray and malleable iron applications.

Norton K Bond† Cones

resist grooving and chipping . . . add the saving "TOUCH of GOLD" for snagging gray and malleable iron

The Norton K Bond is the most radically improved vitrified bond ever developed for slow speed snagging of gray and malleable iron.

That's why, every time K Bond CRYSTOLON wheels or cones go to work for you, you can count on these profit-boosting "Touch of Gold" advantages:

1. Faster, freer cutting action
2. Much longer wheel life
3. Less frequent dressing
4. Hold corners better
5. Consistently duplicated

K Bond Cones Stand Up Better

In particular, CRYSTOLON cones made with this outstanding bond overcome the usual tendency of vitrified bond cones to groove excessively and chip off when snagging difficult places on gray or malleable iron castings. On these jobs the following reports are typical of very many received from foundries:

"K Bond cones hold form with no chipping. Best ever used."

"Excellent cutting action. Cones lasted an average of 10 hours — longest service life we ever got."

"These cones last us 50% longer than any others and they're tops for fast cutting."

"For durability and cut, K Bond wheels are far the best we ever tested."

See your Norton Distributor about arranging a test of K Bond CRYSTOLON cones and wheels in your own plant. NORTON COMPANY, Worcester 6, Mass. Distributors in all principal cities, listed under "Grinding Wheels" in your phone directory, yellow pages. *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Mass. W-1624

Making better products...
to make your products better

NORTON

and its BEHR-MANNING division

NORTON: Abrasives • Grinding Wheels • Grinding Machines • Refractories
BEHR-MANNING: Coated Abrasives • Sharpening Stones • Pressure Sensitive Tapes

†Patent applied for

*Trade-Mark Reg. U. S. Pat. Off. and Foreign Countries

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VANCORAM BRAND

Producers of alloys, metals and chemicals

Two Vancoram Manganese Products for Superior Steel and Iron:

Silicomanganese Alloys
Ferromanganese Briquettes

These two versatile Manganese alloys, members of the Vancoram family of products, were each carefully developed to help steel and iron makers produce metals of the highest quality with maximum efficiency.

VANCORAM SILICOMANGANESE ALLOYS, available in three grades, are valuable additions to both steel and cast iron . . . serving as a furnace block, deoxidizer, desulphurizer and source of manganese. These alloys are noted for their purity and uniformity of composition.

Carbon	Manganese	Silicon
1.50% max	65/68%	18/20%
2.00% max	65/68%	15/17.5%
3.00% max	65/68%	12/14.5%

VANCORAM FERROMANGANESE BRIQUETTES are recommended for use in iron as a manganese addition agent and also as a desulphurizer. Their shape is oblong for swift identification, their weight is approximately 3 pounds per briquette for easy handling, and their manganese content is exactly 2 pounds for simple addition without weighing.

The Briquettes are furnished in convenient palletized form, if required, thus simplifying handling and storage and reducing contamination.

Whether you make your additions to furnace, cupola or ladle . . . you'll consistently get better, more uniform results when you use Vancoram Silicomanganese Alloys or Vancoram Ferromanganese Briquettes.

Here are Complete facilities...

for your CAST AND MACHINED PARTS

City Pattern Foundry & Machine Company offers unparalleled facilities for the complete production of cast and machined parts. Working directly from your part print, we make the pattern, cast the parts and then precision machine them; all operations are performed right under our own roof.

In every phase of the processing the most modern methods and equipment are used. And to safeguard consistent high quality, every known piece of inspection equipment is on hand to chemically, physically and dimensionally measure your parts before shipment.

Thus, complete responsibility for your cast machined parts are in the hands of one competent, completely equipped source. Why not take advantage of the obvious benefits next time *you* are ordering cast and machined parts.

TTING THE PATTERN IN PATTERNS

Since 1913...

CITY PATTERN
FOUNDRY AND MACHINE CO.

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Baird Associates Presents...

Quality Control On The Production Floor

With the new Baird Spectromet*, spectrochemical analysis is possible directly on the floor of the foundry and in the meltshop. Thirty to forty seconds after the sample is burned, the concentrations of six elements in the sample are read from indicators located on the face of Spectromet*. The indicator readings can be easily and rapidly translated into accurate corrections in the melt and give constant control of the contents of the melt.

The speed of the instrument's operation permits as many as 180 determinations per hour providing practical analytical data at low cost per sample. Sealed optical and electronic compartments provide a built-in laboratory environment. Maintenance is reduced to a minimum.

For more information why Spectromet* can help serve your analytical needs, write for free technical Bulletin #42.

Visit Booth 25, 26, 27
Pittsburgh Analytical Exposition
March 1-4, 1955

Baird Associates, Inc.

33 University Road · Cambridge 38, Mass.

*Trade Mark

OREFRACTION
ZIRCON
SAND
AND
FLOUR
For Foundry Practice—
• DOMESTIC & AUSTRALIAN ZIRCON FOUNDRY SANDS
• ZIRCON FOUNDRY FLOURS IN 200 AND 400 MESH PARTICLE SIZES
From Orefraction Inc., a large and leading American processor of Zircon ores.
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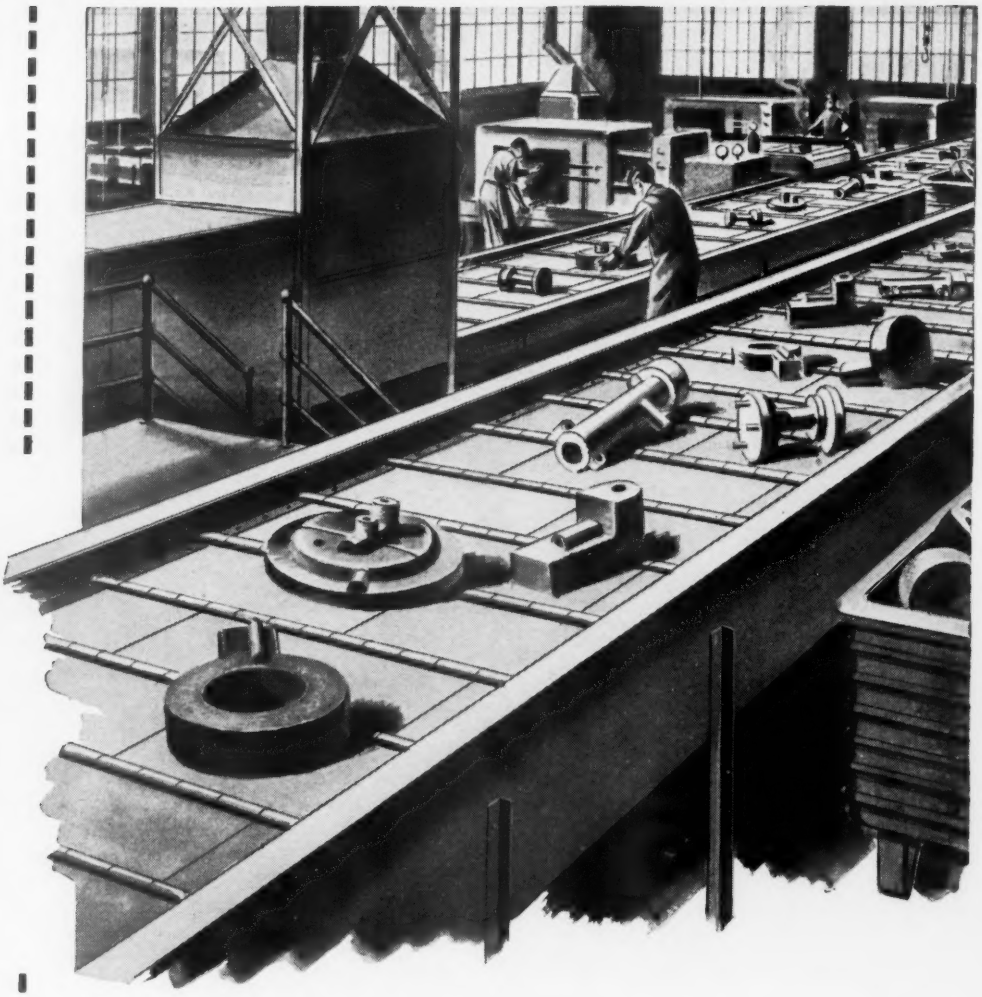
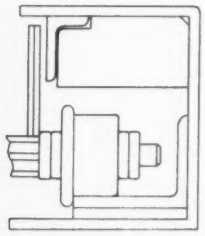
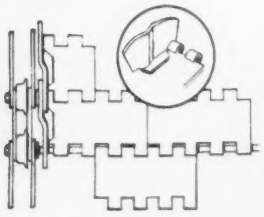
the belt with 9 lives



May-Fran hinged-steel conveyor belt . . . out performs them all in the foundry



Drawing shows construction details of "skirt" which prevents entry of foreign matter and protects side chains.



Outside links incorporate interlocking wings . . . remain positively engaged at all times.

May-Fran Belting is precision formed . . . specifically designed and developed to handle hot, heavy and the most abrasive parts. That's why it has nine lives.

Heavy gauge hinged-steel links are connected in horizontal rows by means of high-carbon steel rods. Side chains become an integral part of the locking wings which remain positively engaged at all times. Link and rod construction eliminates fall-through.

Widths furnished from 6-inches to 6-feet can meet your specifications for a steel conveyor belt of any length or carrying capacity. Either solid or perforated links are available in 2½, 4, 6, 9 and 12-inch pitch lengths. For conveyor belting that out performs, out lives them all . . . specify May-Fran Hinged-Steel Conveyor Belting.

MAY-FRAN ENGINEERING, INC.

WRITE TODAY FOR LITERATURE

3073-MF

1692 CLARKSTONE ROAD • CLEVELAND 12, OHIO

DESIGNERS AND BUILDERS OF COMPLETE HANDLING SYSTEMS

Clean Small Openings Like This . . .

or Large Areas

More Economically

with

NORBIDE® Pressure Blast Nozzles

There's a NORBIDE Nozzle available to give you exactly the type of cleaning stream you need — from a pencil-thin stream for cleaning small openings to a broad stream for large areas. And NORBIDE Nozzles — lined with the hardest material made by man — maintain stream contour, last longer than any other nozzle made and deliver maximum blasting efficiency at minimum cost per hour.

For full details on cost-cutting NORBIDE® Nozzles, write for your free copy of Form 543.

NORTON COMPANY
43 New Bond St., Worcester 6, Mass.

NORTON
BORON CARBIDE

NORBIDE® . . . *The Longest Nozzle Life you can buy*

YOU'LL DO A BETTER JOB

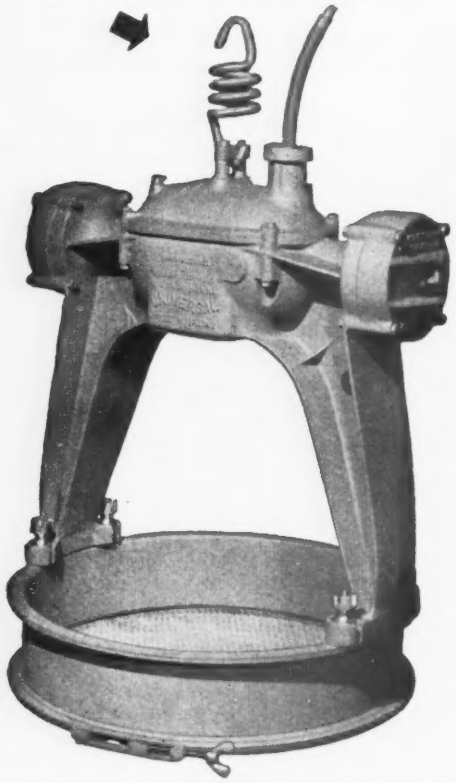
with **H. V. ADAMS DESIGNED**

HIGH EFFICIENCY FOUNDRY TOOLS

"UNIVERSAL FREE WHEELING"

FOUNDRY SAND RIDDLE

with the Double Eight Vibration

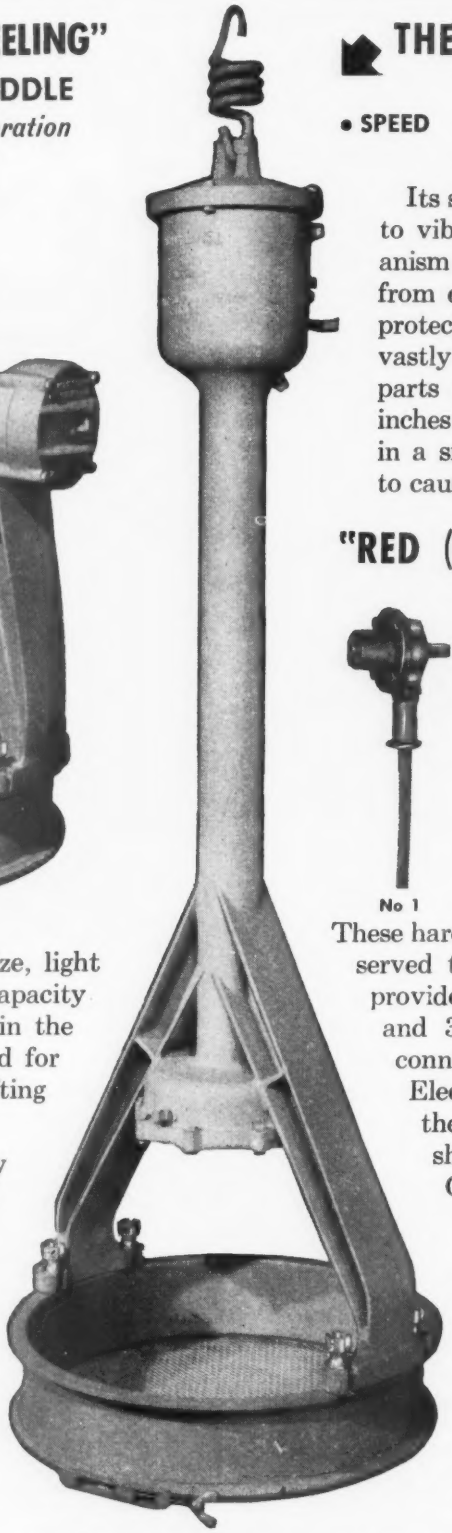


Because of its convenient size, light weight and good riddling capacity it long has been a favorite in the foundry. It also can be used for mixing core sand or for sifting sand directly into molds.

The mechanism is entirely enclosed protecting it from harmful dust and grit.

The main frame is cast in very strong tough aluminum.

It uses quick change ferruled sieves with 20 in. diameter sifting area. There are no loose wires to harm hands.



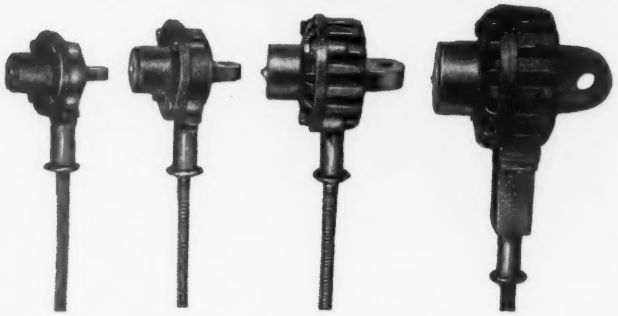
THE "ROTOPLANE" SPEED SIFTER

WILL GIVE YOU

- **SPEED**
- **ECONOMY**
- **SAFETY**
- **LONGER LIFE**
- **GREATER SIFTING CAPACITY**

Its sturdy one-piece frame and long shaft add to vibration effectiveness. The sealed-in mechanism assures protection of motor and bearings from exposure to dust and grit. This sealed in protection and "Rotoplane's" free-rotary action vastly increase bearing life. No exposed moving parts endanger the operator. Sieves have 20 inches diameter clear sifting area—are mounted in a smooth steel ferrule with no jagged edges to cause dangerous cuts and scratches.

"RED (Devil) ELECTRIC" VIBRATORS



No 1 No. 2 No. 5 No. 9

These hard hitting Adams designed Vibrators have served the foundries for over 30 years. They are provided with a 6 foot 3 wire authorized cable and 3 wire grounded connector which, when connected with our 3 wire grounded Red Electric Knee Switch, automatically grounds the vibrator protecting the worker from shock. The vibrators have passed the U. S. Government code inspection.

Other Foundry Products:

- **No. 11 NOISELESS TYPE VIBRATOR**
- **A-20 ELECTRIC VIBRATOR**
- **RED ELECTRIC KNEE SWITCHES**
- **"ROTO" ADJUSTABLE BIN VIBRATOR**
- **2 MIN. UNIVERSAL FINENESS TEST SIFTER.**
- **UNIVERSAL TRIPOD CARRIER**

ORDER ALL SIFTERS AND VIBRATORS WITH GROUND WIRE!!

FOUNDRY SUPPLIES MANUFACTURING CO., NOT INC.

2221 Orchard Street - Chicago 14, Illinois

Established 1918 **Cable Address: "Rotoplane Chicago"** **H. V. ADAMS, Mgr.**

Heroult ELECTRIC MELTING FURNACES

TOPS FOR PRODUCTION OF HIGH GRADE STAINLESS, ALLOY AND RIMMING STEELS

The Ideal Furnace for Foundries

ASK FOR NEW CATALOG

Here's a comprehensive discussion of the modern electric furnace you will surely want to keep for frequent reference. Contains up-to-date information on Heroult Electric Furnaces—types, sizes, capacities, ratings, etc. Write Pittsburgh Office for free copy.

THE HEROULT IS THE SAFEST, most dependable electric furnace on the market. Available in foundry sizes with either Gantry or swing-type roof, the Heroult is equipped with the latest time- and labor-saving mechanical devices and electrical controls. It is noted for its efficient performance, simplified operation, and low operating and maintenance costs.

We welcome an opportunity to help you select and install the electric foundry furnace best suited to your particular requirements.

AMERICAN BRIDGE DIVISION

UNITED STATES STEEL CORPORATION, GENERAL OFFICES: 525 WILLIAM PENN PLACE, PITTSBURGH, PA.

Contracting Offices in New York, Philadelphia, Chicago, San Francisco and other principal cities.

United States Steel Export Company, New York

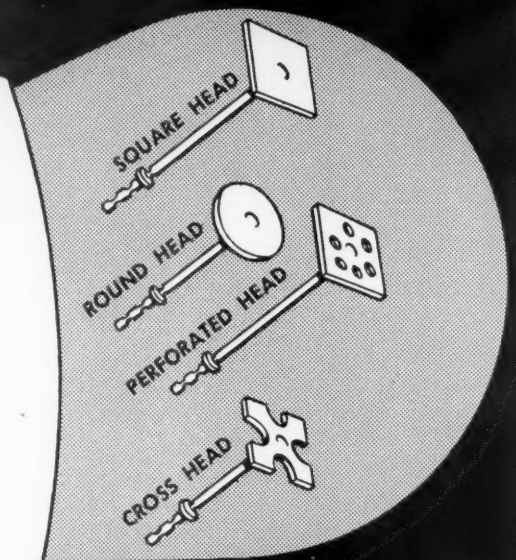
SEE THE UNITED STATES STEEL HOUR. It's a full-hour TV program presented every other week by United States Steel. Consult your local newspaper for time and station.

AMERICAN BRIDGE

UNITED STATES STEEL

MILWAUKEE RADIATOR CHAPLETS

give you an *EXTRA* measure of Quality



For Automotive Castings, Stove Castings, Radiator Castings, or when any light pressure high quality castings are desired, be sure to specify MILWAUKEE CHAPLETS and get the very best in shoulder radiator chaplets.

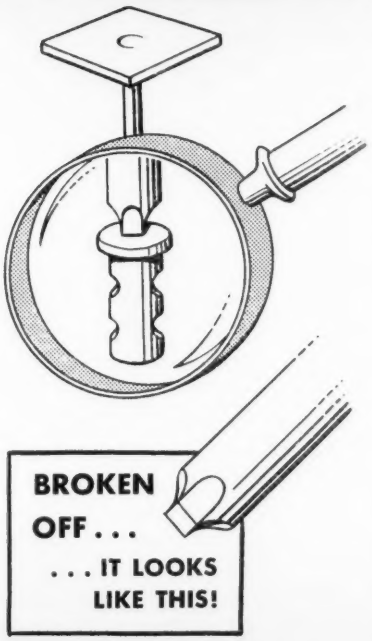
They're precision made of laboratory controlled materials by skilled craftsmen using the most modern manufacturing facilities. You get these outstanding advantages:

• Rigid Specifications • Burr-Less Construction • Clean Break-Off Nicks • Five Inspections • Best Materials for Easy Fusions • Large Dia. of Shoulder for Easy Seating • Thin Shoulders Mean Less Grinding.

NOT ONLY NEW BUT ALSO TRUE

A TRUE FOUR-WAY BREAK-OFF NICK!

Developed at the request of a large Automotive Company, this is a true four-way nick for easy break-off.



MILWAUKEE CHAPLETS

MILWAUKEE CHAPLET & MFG. CO., INC. 1025 S. 40th STREET
MILWAUKEE 15, WISCONSIN

Dear Reader:

This page has been provided for your convenience. Use one of the return cards attached for *more information* on advertisements in this issue.

FURTHER INFORMATION on any of the advertisements in this issue may be obtained by circling the page numbers of advertisements on one of the attached cards. Fill in your name and address, return your card to us—we'll forward your requests to the companies concerned. Further information on their advertisement will come direct to you from the advertiser. *Note: where more than one advertisement appears on a page, the following code is used for identification:* R (right); L (left); T (top); B (bottom); 1-2-3-4 (in order from top to bottom); IFC (inside front cover); IBC (inside back cover); OBC (outside back cover).

● For further information on helpful literature, trade publications, and new equipment descriptions, please refer to IDEAS FOR FOUNDRYMEN insert and return cards on page 223.

FOUNDRY Readers Service

FIRST CLASS
Permit No. 36
(Sec. 34.9 P.L.&R.)
Cleveland, Ohio

BUSINESS REPLY CARD
No Postage Stamp Necessary If Mailed in the United States

4c POSTAGE WILL BE PAID BY—

FOUNDRY
Penton Building
Cleveland 13, Ohio

Readers Service Dept.

MARCH 1955

IFC	28	56	121	163	198	232	251R	268BL
1	29	57	123	164	199	233	252T	268BR1
2	30	58	125	167	200-1	234L	252B	268BR2
4-5	31	59	127	168	202	234R	253	269TL
6	32	60	128	169	203	235	254	269BL
7	35	61	130-1	170	204-5	236L	255	269R
8	36	62-63	133	171	206	236R	256	270L
9	37	64	135	172-3	207	237	257T	270TR
10	38	65	136	175	208-9	238	257B	270BR
11	39	66	138-9	177	210	239	258T	271TL
12	40	67	141	178	211	240	258B	271BL
13	41	68	142	179	213	241L	259	271R
14	42	69	143	180	214	241R	260	272TL
15	43	70-71	147-8	181	215	242	261L	272BL
16-17	44	72	149	182	216	243	261R	272TR
18	45	73	151	184-5	217	245	262	273TL
19	46	74	152	187	219	246	263	273BL1
20	47	75	153	188	222	247	265T	273BL2
21	48	76-77	154	189	225	248T	265BL	273BL3
22	49	78	155	191	226	248B	265BR	273R
23	50	79	156	192-3	227	249L	266T	287
24	51	80	157	194	228	249R	266BL	288
25	52-53	81	158	195	229	250T	266BR	IBC
26	54	82	159	196	230	250B	267R	OBC
27	55	119	161	197	231	251L	268T	

THIS CARD VALID FOR USE IN UNITED STATES AND CANADA ONLY

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TITLE _____

COMPANY _____

ADDRESS _____

CITY & STATE _____

This card MUST be completely filled out. Please TYPE or PRINT

MARCH 1955

IFC	28	58	121	163	198	232	261R	268BL
1	29	57	123	164	199	233	262T	268BR1
2	30	58	125	167	200-1	234L	262B	268BR2
4-5	31	59	127	168	202	234R	263	269TL
6	32	60	128	169	203	235	264	269BL
7	35	61	130-1	170	204-5	236L	265	269R
8	36	62-63	133	171	206	236R	266	270L
9	37	64	135	172-3	207	237	267T	270TR
10	38	65	136	175	208-9	238	267B	270BR
11	39	66	138-9	177	210	239	268T	271TL
12	40	67	141	178	211	240	268B	271BL
13	41	68	142	179	213	241L	269	271R
14	42	69	143	180	214	241R	260	272TL
15	43	70-71	147-8	181	215	242	261L	272BL
16-17	44	72	149	182	216	243	261R	272TR
18	45	73	151	184-5	217	245	262	273TL
19	46	74	152	187	219	246	263	273BL1
20	47	75	153	188	222	247	265T	273BL2
21	48	76-77	154	189	225	248T	265BL	273BL3
22	49	78	155	191	226	248B	265BR	273R
23	50	79	156	192-3	227	249L	266T	287
24	51	80	157	194	228	249R	266BL	288
25	52-53	81	158	195	229	250T	266BR	IBC
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FIRST CLASS
Permit No. 36
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Cleveland, Ohio

BUSINESS REPLY CARD
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FOUNDRY Readers Service

Another Norton ℞ *on the job!*

One of the 1200-pound Ajax induction furnaces used by The Duriron Company, Inc. of Dayton, Ohio. Melts are chiefly stainless steel alloys, tapped at 3200°F or higher. MAGNORITE cement, the Norton ℞ for lining and patching these furnaces, has resulted in substantial savings — not only in the amount and cost of cement, but in time and labor.

The Duriron Company, Inc. doubles heats-per-lining, cuts melting costs, maintains stainless steel quality with MAGNORITE cement*

If re-lining is too frequent a job in your induction furnace operations — if you're using up too much time, cement and money to get maximum heats — we suggest you consider MAGNORITE cement.

Take the experience of The Duriron Company, leading manufacturers of chemical process equipment made of stainless steel and other metals. Before trying MAGNORITE cement, their best previous lining material was giving an average of 68.2 heats per lining. Thorough test runs of MAGNORITE at the Duriron foundry show this Norton refractory material is averaging 140.5 heats per lining. And it is not only lasting twice as long as its best performing competitor, it is more refractory, it has 50% less slag volume on heats, and its freedom from shrinkage eliminates cracking. Another instance of how Norton refractories and refractory materials are *engineered and prescribed* to provide time-and-money-saving ℞'s.

Give MAGNORITE cement a test run

in one of your own furnaces. Note how it withstands temperatures up to 3250°F — how its high-rammed density resists metal penetration, erosion and chemical attack — how its slight expansion when sintered eliminates shrinkage cracks in the crucible lining.

Norton will be glad to specify MAGNORITE cement to your exact requirements, or to help you solve metal-melting problems. Working with MAGNORITE*, ALUNDUM*, CRYSTOLON* and Fused Stabilized Zirconia cements, Norton engineers will find ℞'s you need for efficiency and economy. For details, see your Norton Refractories Engineer, or write to NORTON COMPANY, Refractories Division, 302 New Bond Street, Worcester 6, Mass. *Canadian Representative:* A. P. Green Fire Brick Co., Ltd., Toronto, Ontario.

NORTON

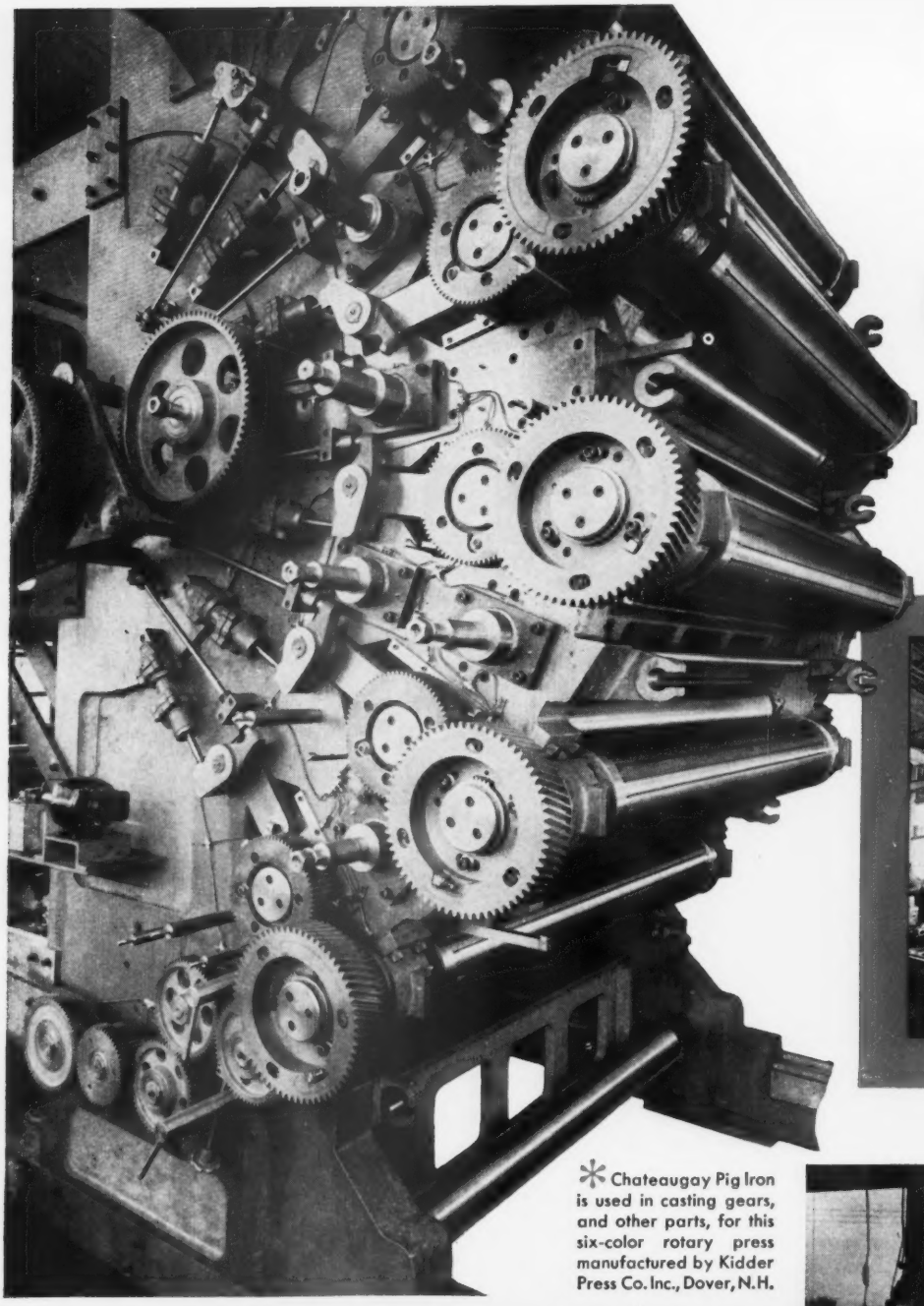
REFRACTORIES

Engineered... ℞... Prescribed

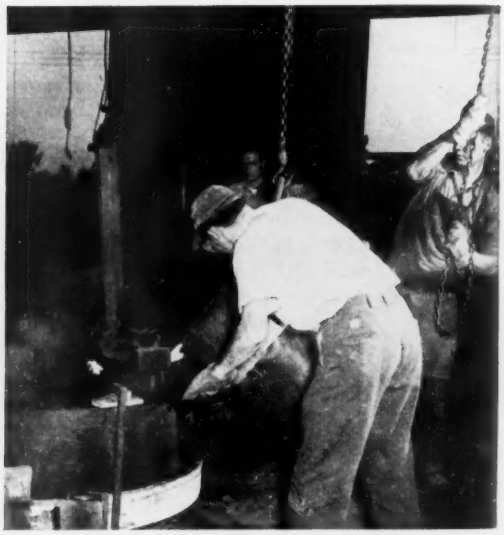
Making better products... to make your products better

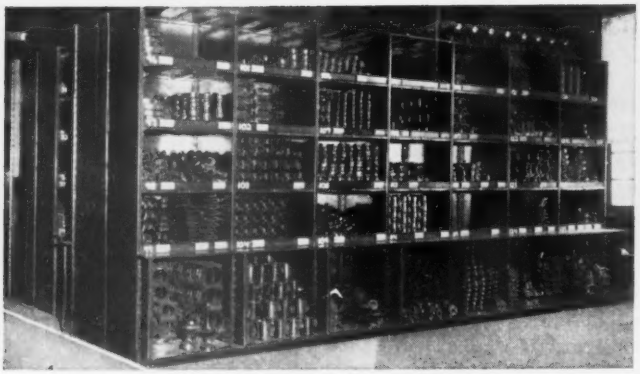
*Trade-Marks Reg. U. S. Pat. Off. and Foreign Countries

castings



✻ Chateaugay Pig Iron is used in casting gears, and other parts, for this six-color rotary press manufactured by Kidder Press Co. Inc., Dover, N.H.





Republic Wedge-Lock Steel Shelving solves the problem of storing castings, patterns and other items. It is specifically designed for high stacking of enormous weights—with no sagging, swaying or buckling. As weight increases, joints get tighter, increasing the stability and rigidity of the entire assembly. You get maximum loading in a minimum of floor space. It's completely flexible, can be assembled quickly and easily.

Republic Chain Slings provide an exceptionally high degree of safety in foundry operations. Republic makes three types, alloy steel, high carbon steel, and wrought iron. A Republic Chain Engineer will tell promptly and impartially which type is best suited to your particular needs. All Republic Chain Slings are proof tested and warranted.

with a fine finish* call for CHATEAUGAY PIG IRON

Kidder multi-color rotary presses for flexographic, rotogravure and letterpress printing are as precise as a fine timepiece. Nothing is spared to meet the known requirements for perfect printing. Only the finest materials are used, including Chateaugay Pig Iron.

Kidder's requirements for cast parts are strict. They call for a fine surface finish, wear-resistance, high strength and top machinability. To meet these requirements, they use Chateaugay, Republic's exclusive premium Pig Iron.

Chateaugay's consistently uniform physicals assure predetermined fine grain structure throughout every casting, regardless of size or shape. It is an exceptionally fluid iron—cools evenly—fills adjoining light and heavy sections completely.

In addition, Chateaugay castings machine beautifully and economically, whether milled, drilled, turned, tapped, ground or threaded.

A Republic Pig Iron Metallurgist will be glad to show you how Chateaugay, the low-phosphorous, copper-free Pig Iron, consistently outperforms other pig irons. There's no cost or obligation. Mail the coupon for prompt action.

REPUBLIC STEEL

World's Widest Range of Standard Steels and Steel Products

Republic Foundry Flasks speed molding efficiency through ease of operation, ease of handling and through long trouble-free service. Each cope, cheek and drag is welded into one integral piece of steel, ribbed and flanged to provide strength and rigidity. Flasks can be designed and manufactured in various sizes and gages of steel to meet your individual requirements.

REPUBLIC STEEL

REPUBLIC STEEL CORPORATION
3132 East 45th Street • Cleveland 27, Ohio

☐ Please have a Pig Iron Metallurgist call.

I am interested in more information on:

☐ Chain Slings ☐ Steel Shelving ☐ Foundry Flasks

Name_____ Title_____

Company_____

Address_____

City_____ Zone____ State_____

K-7789

LESS MAN-HOURS PER TON WITH TRULINE®-BONDED CORES

In the core room, in the molds, and in the cleaning room, foundries get more efficient operations, reduced man-hours per ton with Truline Binder.

IN THE CORE ROOM—Truline means a quick bake, no oven bottlenecks.

IN THE MOLDS—Truline means strong cores, elimination of breakage. And Truline is moisture resistant.

IN THE CLEANING ROOM—Truline's collapsibility means cores are easily removed by knockout or hydroblast. Man-hours are reduced, casting repairs and welding costs minimized.

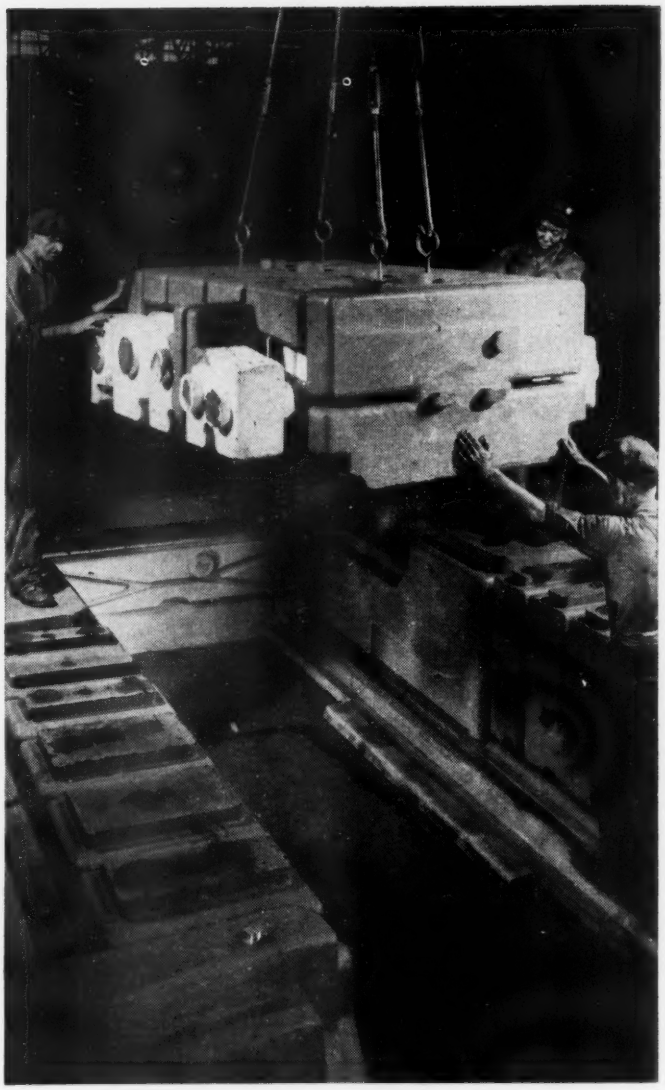
Your Truline Binder serviceman will be glad to discuss the many advantages of Truline with you. Or write:

Naval Stores Department

HERCULES POWDER COMPANY

INCORPORATED

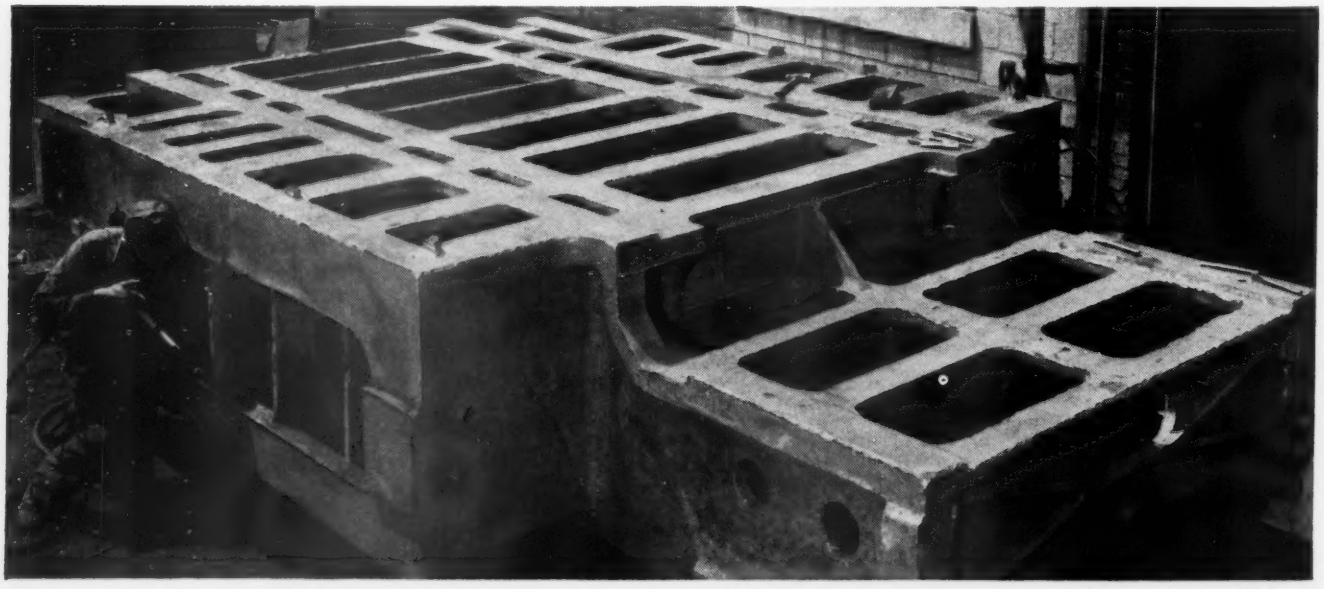
920 King Street, Wilmington 99, Del.



(PHOTOS COURTESY ELYRIA FOUNDRY CO.)

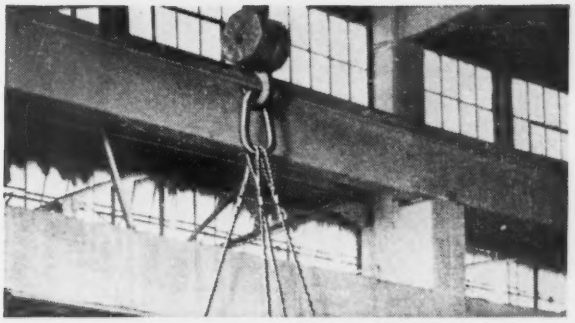
IN THE CORE ROOM—Coring large molds such as this can be done more quickly, more efficiently when fast-baking Truline Binder is used.

IN THE CLEANING ROOM—Preparing this twenty-six ton iron casting for shipping can be done in a minimum of time due to the crack-free, semi-finished casting produced from Truline-bonded cores.



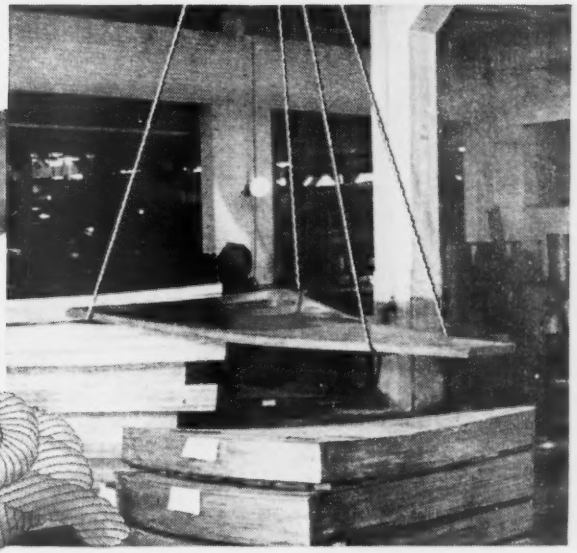
NF55-1

PROVE Tuffy®



GIVES YOU MORE SERVICE PER DOLLAR

FREE Tuffy® SLING



ABUSE IT! MISUSE IT! IT WILL STILL PROVE TOUGHEST SLING OF ALL!

Do Your Worst to the free Tuffy Sling we send you! Loop it, kink it, jerk it, knot it—subject it to the conditions that ruin the most slings for you. You'll find Tuffy takes more rough treatment than any sling you've ever used!

Tuffy's Patented Construction is an exclusive, machine braided-wire fabric that's extra flexible to help resist kinking. If you *can* kink it, your Tuffy Sling is easy to straighten without material damage!

Send For Your Free Tuffy Sling and try it on the toughest tests you can devise. Find out for yourself why Tuffy Slings are the toughest you can buy!

Your Tuffy Distributor Stocks to Meet Your Needs

When You Need Rope Fast, your Tuffy distributor is a handy man to know. Because he's happy to stock ahead of your replacement schedule . . . be ready with the rope you want, *when* you want it. Just give him an idea of your requirements and he will order from his nearby mill depot for months-ahead service. Talk to him *soon!*

Tuffy® HOIST LINE

Strong As Tuffy Slings! Tuffy Hoist Line is constructed to handle the varied strains of lifting over a long period of time . . . give you extra safety from drum to sling!

Easy To Order because there are no complicated specifications — just length, diameter and "Tuffy Hoist Line." Whether you use overhead, stiff leg or mobile cranes, derricks or clam shells, try Tuffy Hoist Line and see the difference!

TEAR OFF AND MAIL COUPON *NOW!*

Union Wire Rope Corporation
2280 Manchester Ave., Kansas City 26, Mo.

At no cost or obligation to me, please rush the material I have checked

- ☐ FREE 3-Ft. Tuffy Sling!
- ☐ FREE Sling Handbook and Rigger's Manual, Featuring 12 Tuffy Factory-Fitted Types!
- ☐ Name and Address of Tuffy Distributor Nearest Me!

FIRM NAME_____

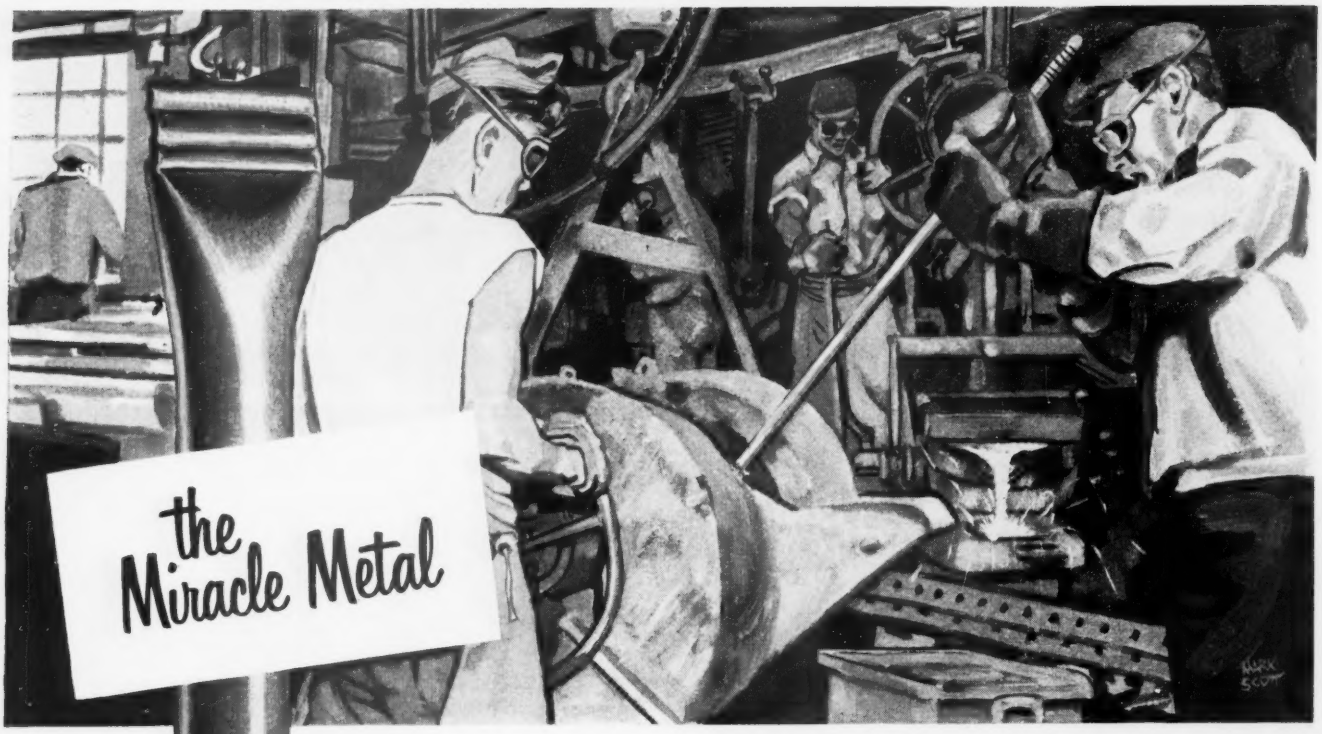
BY_____ TITLE_____

ADDRESS_____

CITY_____ ZONE_____ STATE_____

union Wire Rope **corp.**

Specialists in High Carbon Wire, Wire Rope and Braided Wire Fabric



LITHIUM

Only 0.005% makes a sounder nonferrous casting

Lithium economics and technique are both within the limits of everyday nonferrous foundry operation. A small slug (2¼ grams) of metallic Lithium added to a charge of molten copper effectively removes dissolved oxides and gases. End result is an improved, more uniform casting. By adding Lithium the surer way—in the handier *cartridge* form—you eliminate the "by-guess-and-by-gosh" formulation too common with less satisfactory methods.

Specifically, tensile strength and elongation are increased, porosity decreased, and grain size reduced. Characteristic low density causes the Lithium products formed to float to the surface where they are easily removed as slag. Again, Lithium Cartridges give you a sounder casting with less trouble and at less cost.

Tests under production conditions in nonferrous foundries have long established Lithium in metallurgy as a degasifier, deoxidizer, desulfurizer and general purifying agent. As a degasifier of Nickel Bronze, for example, Lithium Cartridges make possible a dense, fine-grained metal. Hermetically sealed in copper tubing, three sizes—2.25, 4.50 and 9.0 grams—are available.

Investigate Lithium Cartridges. Write for details of actual foundry tests. The small amounts of Lithium required put this revolutionary technique within *your* reach.

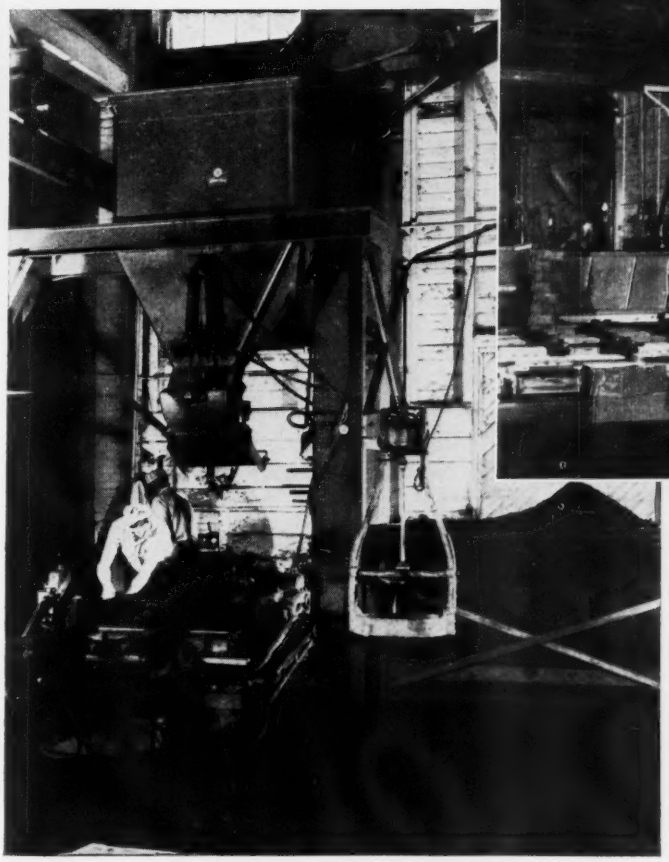
The application of Lithium requires no radical changes in conventional melting and casting processes. The cartridges are *quickly* introduced into the lower part of the crucible by wiring them into an inverted piece of angle iron or stainless steel, welded to a long rod handle, to prevent the light cartridge from rising to the surface before the reaction has taken place.

. . . trends ahead in industrial applications for Lithium

LCA **LITHIUM CORPORATION OF AMERICA, INC.**
Suite B
Rand Tower
Minneapolis 2, Minnesota

MINES: Keystone, Custer, Hill City, South Dakota · Bessemer City, North Carolina · Cat Lake, Manitoba · Amos Area, Quebec
CHEMICAL PLANTS: St. Louis Park, Minnesota · Bessemer City, North Carolina · RESEARCH LABORATORY: St. Louis Park, Minnesota

6 HANDY SANDYS
save 48 hours per day and increase casting production
at Goldens' Foundry & Machine Company Columbus, Georgia



A series of Twin Hopper Handy Sandys working over squeezer machines. Molds are set out on floor by helper for daily pouroff.

One of the Single Hopper Handy Sandys working on large rollover jobs. Castings range from 1 to 1000 lbs., and are used in power transmission products, cotton gin and general machinery industries.

"For a long time we had realized the value of having overhead sand in our Gray Iron jobbing foundry" says the Plant Engineer. "However, it was not logical or economical that we should install a complete sand system since we use several sand mixes in our various molding operations.

"We first became interested in Newaygo Equipment because of its adaptability to jobbing foundry work, and it also seemed to be the answer to our sand handling problem. In 1950 we ordered one Twin Hopper and one Single Hopper Handy Sandy. They worked out very satisfactorily and in 1951 we reordered two more of each.

"These Newaygo Handy Sandys have been in operation for several years and have required very little maintenance. Casting production on the six floors served by the 3 Twin Hopper Handy Sandys remained about the same. Our big gain has been the savings of 48 man hours per day on these same floors. On the 3 Single Hopper Units we still use the same number of men for rollover work, however we are getting a definite increase in casting production.

A copy of "Planned Mechanization for Foundries" is yours for the asking. Write, wire, or phone today.

NEWAYGO engineering company
NEWAYGO, MICHIGAN
Manufacturers of Neway® Mold Handling, Sand Handling and Conditioning Equipment

TRAMRAIL COVERAGE *SPEEDS* FOUNDRY PRODUCTION

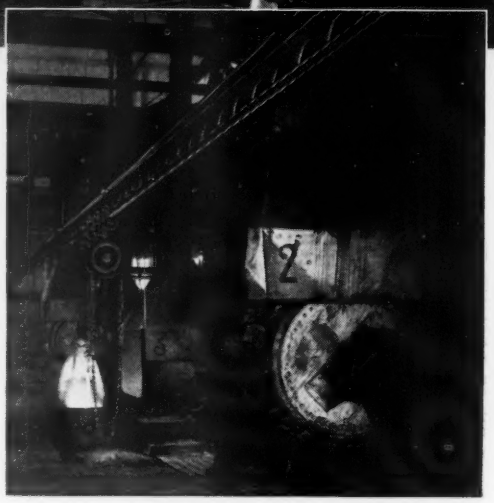
Jobbing Foundry Cuts Costs with Hand-Propelled System

Metal is quickly transferred to the hand-pouring ladles. This Cleveland Tramrail system is completely hand-propelled. Gray iron, aluminum, magnesium, brass, bronze, and monel castings are produced in this jobbing foundry.

When one considers that as much as 250 tons of materials must be moved to produce one ton of finished castings, depending on casting size, the importance of easing and speeding foundry handling is self-evident. Saving just one minute on every ton handled will reduce production time by over four hours.

Cleveland Tramrail equipment enables such tremendous time savings that frequently the output of a plant is increased by 25% to 100% without adding an additional foot of floor area.

Why not give Cleveland Tramrail a trial in your foundry? A representative will be glad to give you the details.



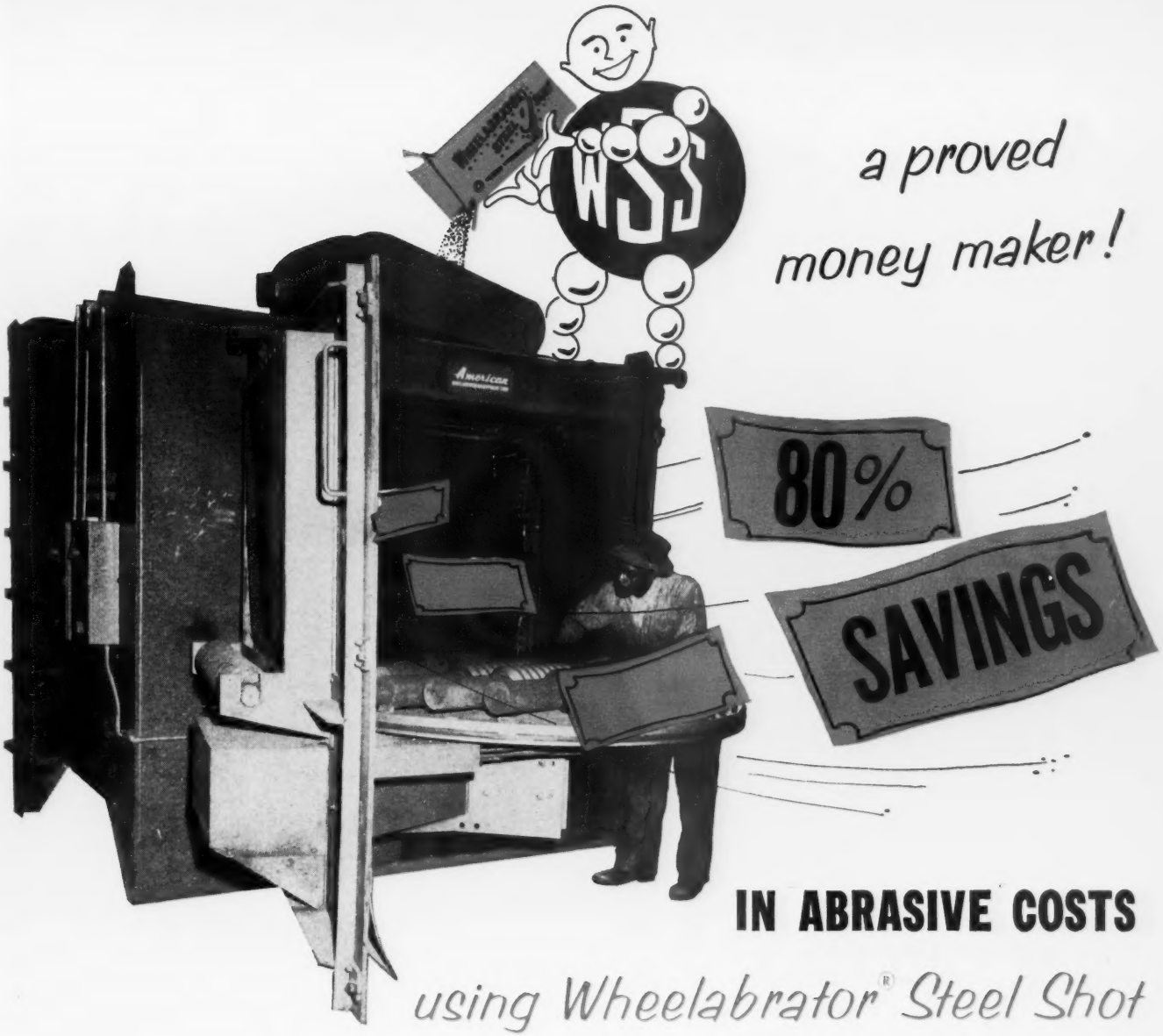
Bull ladles with hot metal from these electric furnaces are easily conveyed on the overhead Tramrail directly to the pouring floor.

GET THIS BOOK!

BOOKLET No. 2008. Packed with valuable information. Profusely illustrated. Write for free copy

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
3831 East 286th Street, Wickliffe, Ohio

CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT



a proved money maker!

IN ABRASIVE COSTS

using Wheelabrator® Steel Shot

at Ace Sandblast Co. Chicago, Illinois

Here's how you can obtain the lowest possible overall cleaning costs. Switch to Wheelabrator Steel Shot for all your blast cleaning operations. Make savings like those experienced at Ace Sandblast Co., a Chicago job cleaning shop:

Since switching to Wheelabrator Steel Shot abrasive costs have been slashed 80%, and machine maintenance costs drastically reduced, with a remarkable improvement experienced in cleaning time and surface appearance. Overall savings in one year's time enabled them to purchase their fourth Wheelabrator machine.

Hundreds of other satisfied users have experienced exceptional cost savings with this high carbon, heat treated steel shot designed exclusively for shot blasting operations. If you want to reduce your cleaning costs, switch to Wheelabrator Steel Shot. Write for Bulletin 89B for the complete story.

American WHEELABRATOR® *trail blazer of industrial progress*

AMERICAN WHEELABRATOR & EQUIPMENT CORP. 505 S. Byrkit St., Mishawaka, Indiana

here's why

MORE FOUNDRYMEN PREFER PURITE TRADE MARK ....

"Purite gives 100% fluxing action in the cupola—100% desulphurizing action in the ladle."

"Purite comes in uniform 2-lb. pigs—no weighing or measuring required."

"Purite permits the use of higher-sulphur raw materials."

"Purite can be shipped in bulk carloads at substantial savings over bag shipments—is easily stored without deterioration."

"Purite is time-tested and proved for rapid and unsurpassed desulphurizing uniformity."

"Purite is 100% pure fused soda ash—you do not pay for inert materials."

"Purite produces higher percentages of finished castings—fewer rejects per ton of metal poured."

"Purite does not crumble—is easy to handle—no waste, no dust."

"Purite, the scientific flux for better melting and cleaner iron, is sold by leading foundry supply houses in the United States and Canada."

MATHIESON

MATHIESON CHEMICALS
OLIN MATHIESON CHEMICAL CORPORATION
INDUSTRIAL CHEMICALS DIVISION • BALTIMORE 3, MD.

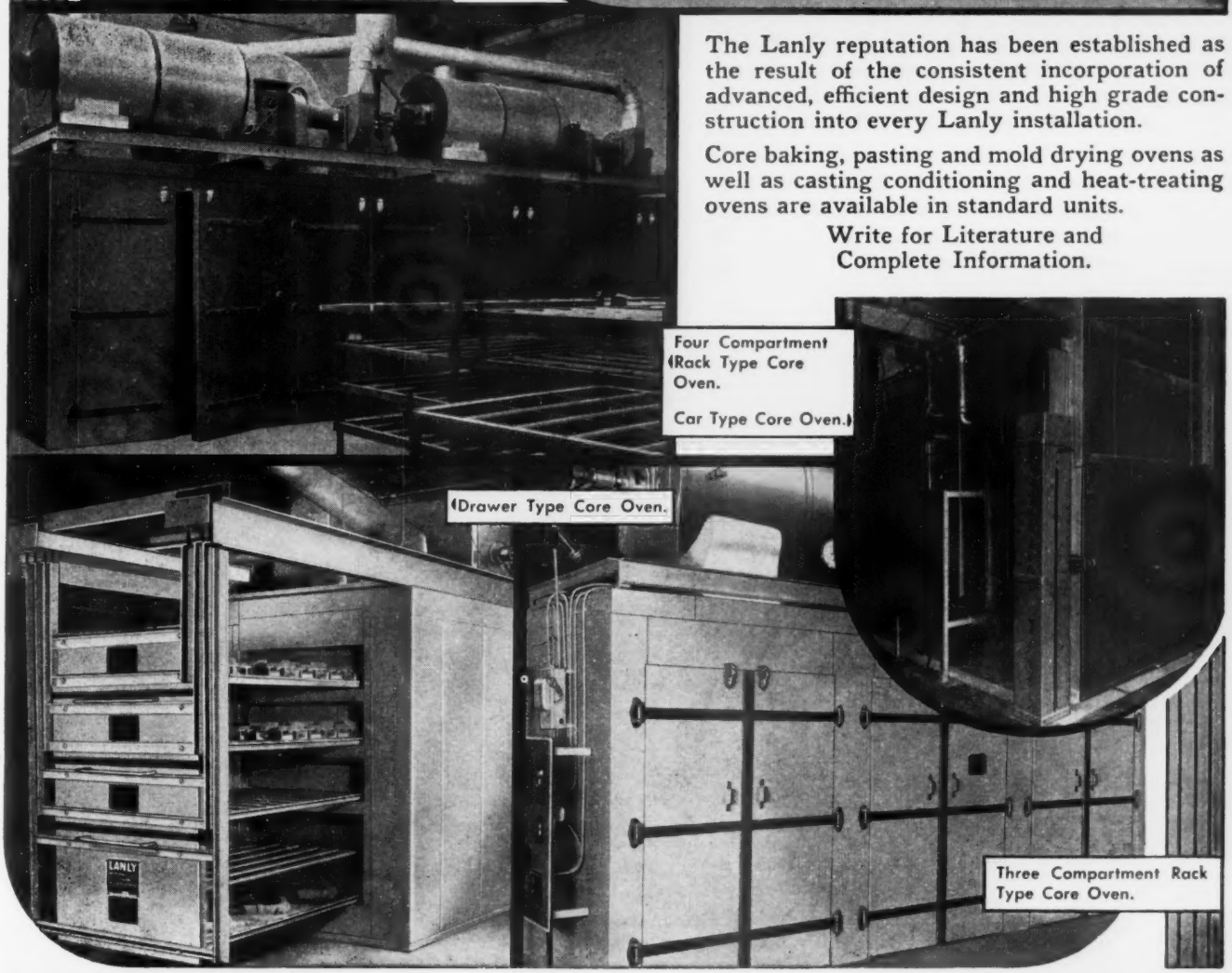
2974

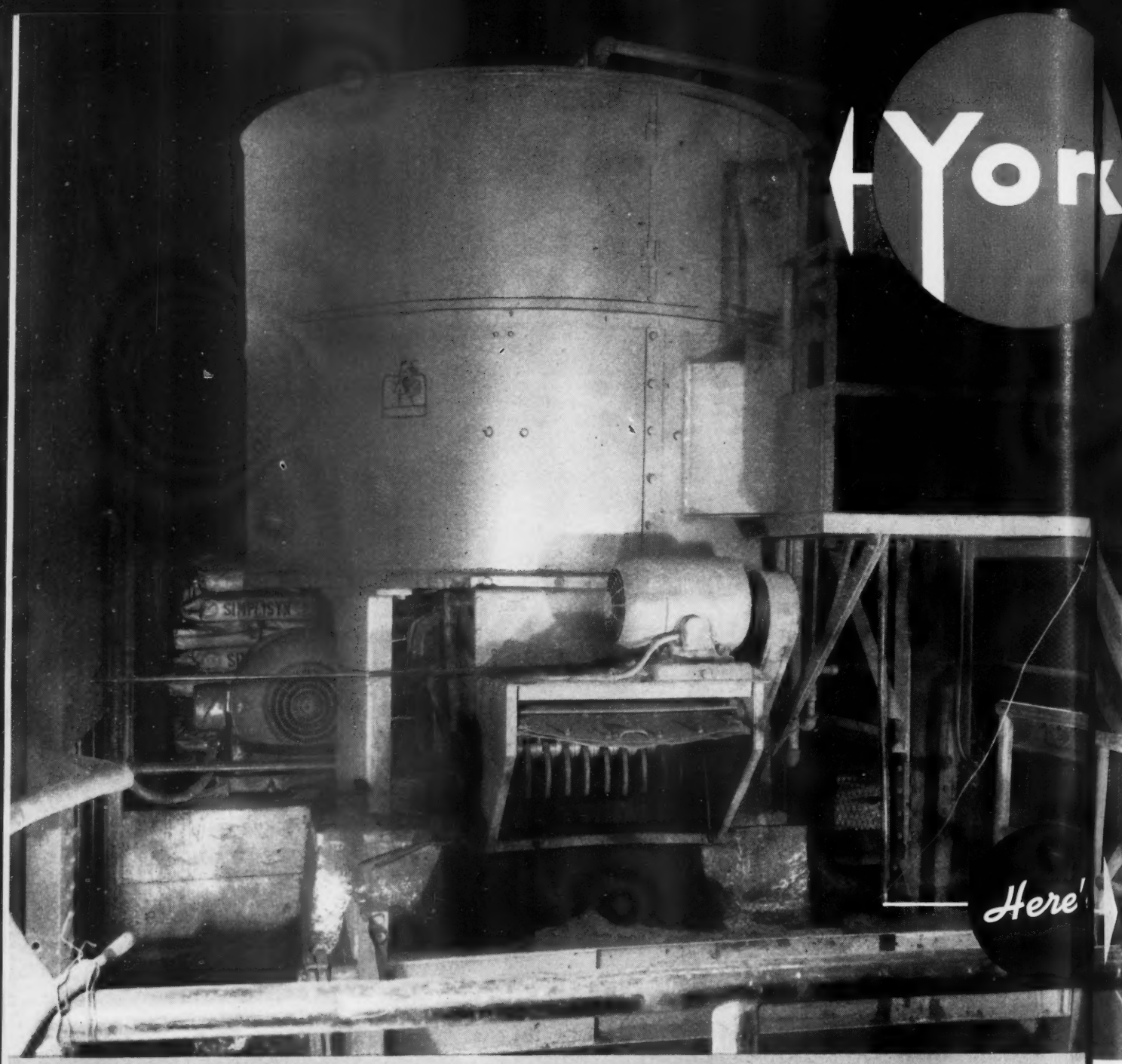
Two Compartment Car Type Mold Drying Oven.
Two Compartment Rack Type Core Oven.
Single Compartment Rack Type Core Oven.
LANLY
FOUNDRY OVENS
THE LANLY COMPANY • 780 PROSPECT AVE
CLEVELAND, OHIO

The Lanly reputation has been established as the result of the consistent incorporation of advanced, efficient design and high grade construction into every Lanly installation.

Core baking, pasting and mold drying ovens as well as casting conditioning and heat-treating ovens are available in standard units.

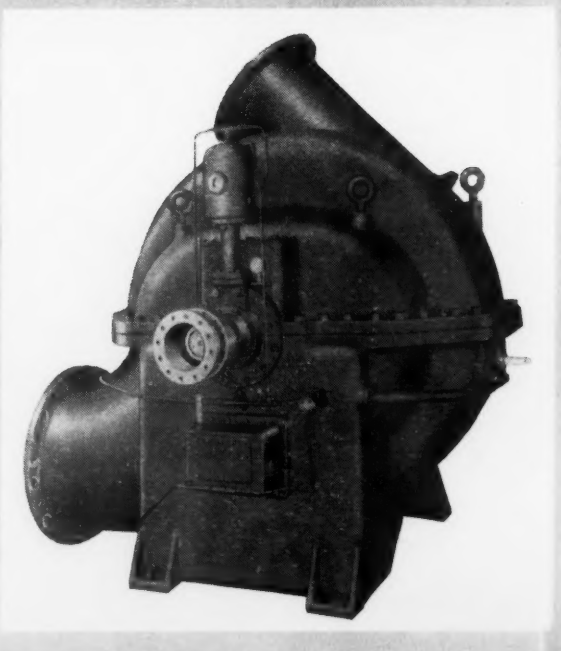
Write for Literature and Complete Information.





● **LEFT—At York, shakeout sand is stored in slinger tank (left) and fed to preparing unit (right) via shakeout and magnetic belt. NATIONAL engineered shakeout arrangement is unique and effective in breaking hard baked floor sand lumps.**

● **RIGHT—Typical York Turbo-compressor unit. Widely used in shipboard and industrial air conditioning applications, these units are largely castings . . . require special mold and sand characteristics and a *rugged* 3F Mix-Muller for special Dorchester gravel sands.**



depends on SIMPSON MIX-MULLER

for tough gravel sand preparing job

A well known and respected name in the manufacture of commercial and residential air conditioning equipment, York Corporation of York, Penna. are also "heavy" in shipboard and industrial air conditioning equipment . . . and "heavy" is the word for some of their floor molding work. (See chart at right.) One typical valve body core uses 15 cu. ft. of sand and measures 36"x60"x60".

Though a Simpson user for over 23 years, York Corporation uses many types of sand preparing equipment in their extensive foundry operations . . . but the *tough* jobs, where high quality is vital and ruggedness a prerequisite, are assigned to the Simpson Mix-Muller.

The No. 3F Mix-Muller shown at left has been turning out a top quality job on tough Dorchester gravel sand for York's floor molding work for over a year now . . . the repairs to date?—4 plows.

There's a reason why York Corporation, as well as other leading foundries everywhere, look to Simpson for *performance* in critical mixing jobs. Mixing is our *business* at National—our *principal* business since 1914. Read how these years of experience are "built in" to the new F Series Mix-Muller . . . then write for Bulletin 511.

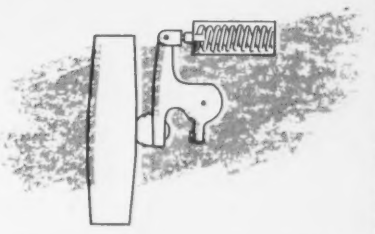
YORK CORPORATION SAND CHARACTERISTICS (Floor Molding

	DRY SAND FACING	FACING SAND
Average Baked Shear	40	55
Average Permeability	60	—
Average Green Compression	10.4	11.9
Average Moisture	5.5	6.5
Average Flowability	7.1	6.6
Average Volatiles	4.5	7.2

HOW THE *NEW* SIMPSON MIX-MULLER CAN GIVE YOU MORE FOR EVERY MULLING DOLLAR

SIMPLE, RUGGED, DEPENDABLE

Available in batch capacities of from 25 to 4000 lbs., new F Series Mix-Muller is simple in design and operation and relies on proven, efficient and economical stationary pan principle. All power is used to *mix* . . . none wasted in moving *sand*. Automatic, bottom discharge is quick, dependable.



SPRING-LOADED MULLERS

Positive control over varying sand characteristics is possible with unique, easily adjusted spring tension method of applying infinitely variable muller pressures. New plow design and muller suspension arrangement helps to break up agglomerate grains quickly . . . a fluffy sand of high flowability results.

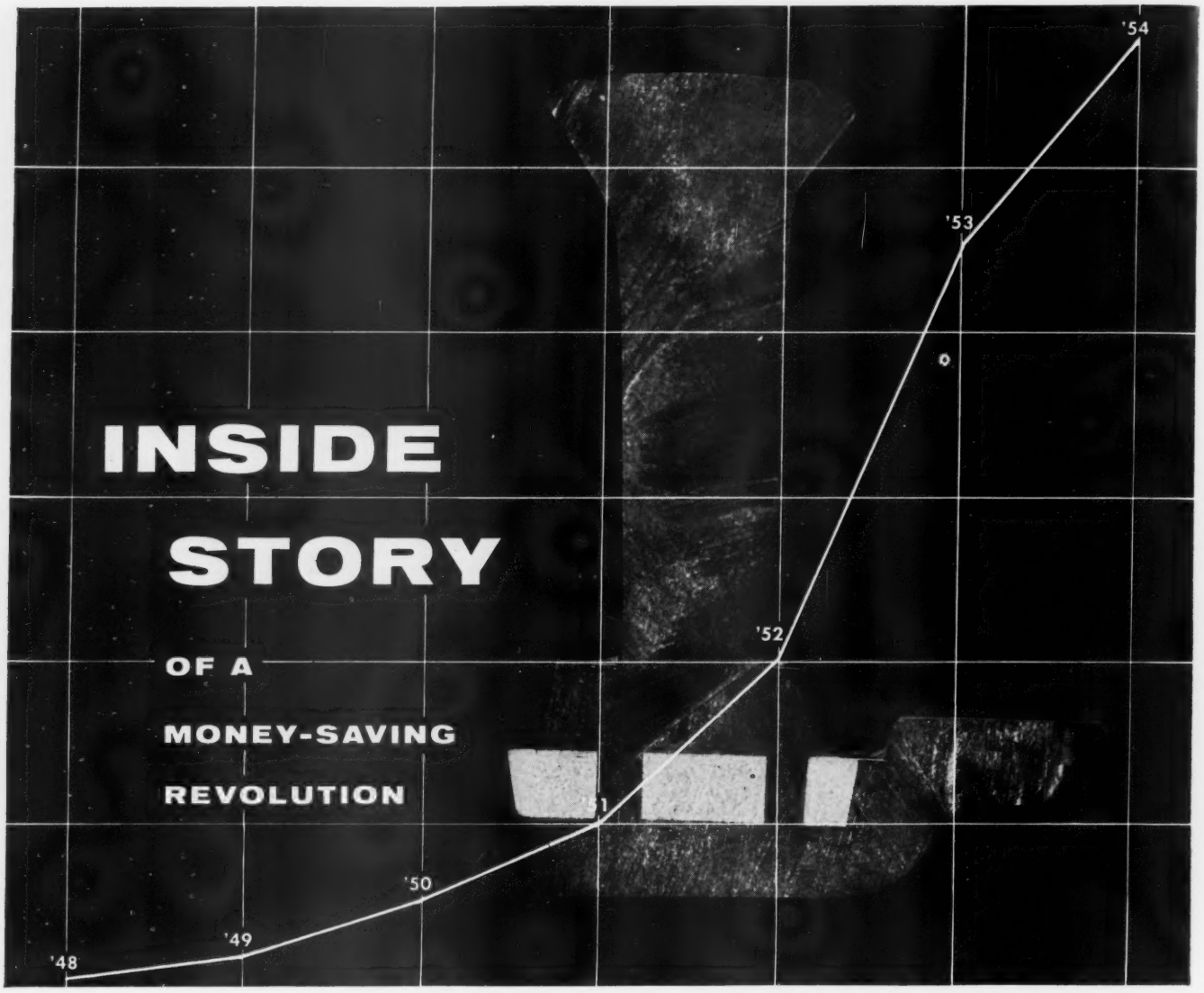
LOW MAINTENANCE

Centralized lubrication, anti-friction bearings and new, easy access door through crib are only a few of the many features that add up to long life, easy maintenance for the new F Series Mix-Muller.

National Engineering Company
(Not Inc.)
646 Machinery Hall Bldg. • Chicago 6, Illinois

PRODUCTS OF THE PRACTICAL FOUNDRYMAN

SIMPSON *Intensive* MIX-MULLERS



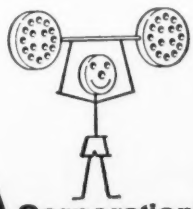
Take a *second look* at that cutaway casting above! Note the clean, sharp lines where the molten metal has passed through the strainer core. Here is *proof* that Louthan Refractory Cores give you closer control of the metal. They also keep slag and core-sand inclusions out of castings, save needless grinding and rejects.

Now, take a look at the sales curve above! That tells a significant story of the growing use of *refractory* strainer cores. There is only one reason for this: *they save money* for foundrymen in the making of castings.

Louthan Refractory Cores will withstand 3,000°F. temperatures without spalling or disintegrating. They are exceptionally uniform, dimensionally accurate, easy to use.

If you haven't yet tried them, we invite you to do so. Standard sizes range from 1¾" to 3½" diameter, while special sizes and shapes can be made for your specific requirements. Why not write for full details?

Louthan **REFRACTORY STRAINER CORES**



Louthan Mfg. Co., East Liverpool, Ohio (Subsidiary of FERRO Corporation)

REPRESENTATIVES: FREDERIC B. STEVENS, INC., 1800 18th St., DETROIT 16, MICH.; 93 Stone St., BUFFALO, N. Y.; 36 Shelby St., INDIANAPOLIS 7, IND.; P. O. Box 1716, NEW HAVEN, CONN.; 41 Dovercourt, TORONTO 1, ONT., CAN.; 1262 McDougall St., WINDSOR, ONT., CAN. FOUNDRY SUPPLY CO., 5009 Excelsior Blvd., MINNEAPOLIS 16, MINN.

A completely new and different

PAYLOADER®

TRACTOR SHOVEL

NEW MODEL HA

BUCKET CAPACITY
18 cu. ft. PAYLOAD
14 cu. ft. Struck-Load

NEW standards of safety, capacity and low maintenance

The greatest advance in tractor-shovel design in years — with more features — more digging power — more capacity — more performance than you ever thought possible in a tractor-shovel of this size.

The famous HA "PAYLOADER" has led the industry for over 15 years — this NEW 1955 Model HA is even more sensational. It has twice the digging power, lifting capacity and carrying capacity — has 16⅔% more bucket capacity — 18% more dumping height — and will increase output from 50 to 100%.

Before you buy any tractor-shovel, see this new Model HA — ask your dealer for a demonstration — find out what it can do to reduce *your* bulk material handling costs.

Outstanding features:

Powerful "break-out" digging action Upward rotation of the bucket combines with forward motion of machine in a powerful slicing action that gets full loads quickly, even from lumpy, sticky or heavy materials.

Bucket tip-back of 40 degrees when only 6 inches off the ground carries heaped loads *low* and *close* for maximum stability, balance and safety.

New standards of safety Boom arms and parts are mounted *low* and carry loads *low* and are always clear of the operator. Operator visibility is good at all times.

Advance-design hydraulic system includes: sealed, pressurized hydraulic tank — no breathing of dirt and grit into hydraulic fluid; hydraulic accumulator prevents pressure shocks — gives easier, safer control.

Torque-converter drive and full-reversing transmission with two speed ranges insures fast moves in either direction — easier operation and control — more production.

Improved steering. Ball-bearing screw-and-nut type steering with tapered roller bearing bell crank and oversize ball joints — easy-acting, readily-adjusted, low in maintenance.

GAS OR DIESEL POWER OPTIONAL.

THE FRANK G. HOUGH CO.
703 Sunnyside Ave., Libertyville, Ill.

☐ Send me complete model HA information

☐ Send name of my "PAYLOADER" Distributor

Name .....

Title .....

Company .....

Street or Box No. .....

City ..... State .....

PAYLOADER®
MANUFACTURED BY
THE FRANK G. HOUGH CO. • LIBERTYVILLE, ILL.
SUBSIDIARY—INTERNATIONAL HARVESTER COMPANY

Want a dependable source of supply?

USERS OF pig, ingot and billet can rely on Kaiser Aluminum as a dependable source of supply because we are an integrated producer.

We produce pig, ingot and billet to all standard specifications or to special customer specifications.

In addition, Kaiser Aluminum gives faster service and delivery on orders from our conveniently located plants at Newark, Ohio; Chalmette, Louisiana; Halethorpe, Maryland; Mead and Tacoma, Washington.

Our outstanding engineering service includes design assistance and other technical advice. For prompt personal service, contact the Kaiser Aluminum sales office listed in your telephone directory.

Kaiser Aluminum & Chemical Sales, Inc. *General Sales Office:* Palmolive Bldg., Chicago 11, Illinois. *Executive Office:* Kaiser Bldg., Oakland 12, California.

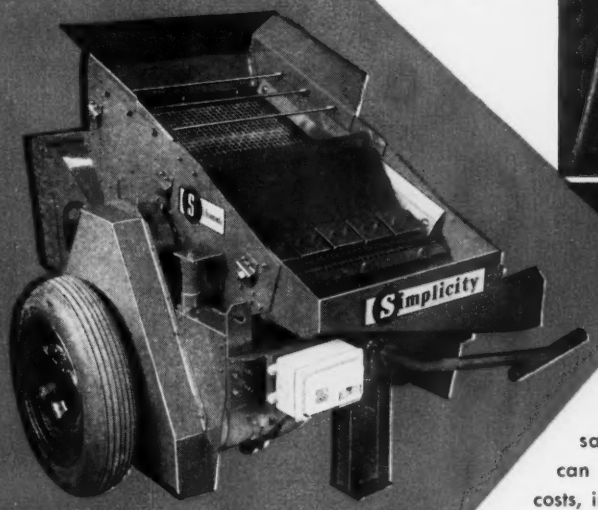
Kaiser Aluminum

The nation's largest supplier of pig, ingot and billet

SIMPLICITY PORTABLE SAND CONDITIONERS INCREASE PRODUCTION —LOWER COSTS

SCREEN, AERATE AND FLUFF IN ONE OPERATION

A SIMPLICITY 4' x 4' Portable Sand Conditioner in operation at Brown Industries Foundry, Sandusky, Ohio. Note the front end loader which is also employed to move the unit.



This SIMPLICITY 2' x 3' Portable Sand Conditioner handles 10 to 15 tons of molding sand per hour—all the sand two men can shovel. The two-wheeled model pictured, is equipped with pneumatic rubber tires 24 inches in diameter. It is especially designed for foundries with sandy or uneven floors. Three wheel solid rubber tired models also available for foundries with hard surface floors. Screen sizes on other models range from 12" x 18" up to 4' x 8'—capacities from 8 to 60 tons per hour.

Foundries without a regular sand handling system can reduce sand handling costs, increase production, and improve the quality of their castings by installing SIMPLICITY Sand Conditioners. Designed for operation on side floors or main bays without sand systems, these compact, portable units screen out hard core butts, chills, gaggers, nails and other pieces of metal and break down hard lumps and balls into finely screened useable sand, thereby eliminating sand waste. In the same operation, the sand is thoroughly aerated and fluffed, producing molding sand with a high degree of permeability. The result: good, clean castings that require less shakeout and finishing time; fewer rejects and less scrap. Experienced foundrymen report that the savings made possible through the use of a SIMPLICITY Sand Conditioner will more than pay for the unit in six months or less.

CONSULT A SIMPLICITY SALES REPRESENTATIVE OR WRITE US TODAY FOR FULL INFORMATION.

156

Simplicity
TRADE MARK REGISTERED

ENGINEERING COMPANY • DURAND, MICHIGAN

Sales Representatives in all parts of the U.S.A.

FOR CANADA: Simplicity Materials Handling Limited, Guelph, Ontario.

FOR EXPORT: Brown and Sites, 50 Church Street, New York 7, N. Y.

Announcing...

ELECTROLYTIC MANGANESE

99.9% PURE

Now available from ELECTROMET in tonnage quantities. For all uses where a high purity manganese is required, including:

. *Low-Carbon Stainless Steels*
. *High-Temperature Alloys*
. *Non-Ferrous Alloys*
. *Electrical Resistance Alloys*

Electrolytic manganese is now being produced in tonnage quantities at ELECTROMET's new Marietta, Ohio, plant. ELECTROMET's new manufacturing process produces manganese of very high purity with 99.9 per cent minimum manganese.

Additional information about electrolytic manganese and other ELECTROMET ferro-alloys and metals will be gladly furnished on request. The ELECTROMET office in your area will be pleased to answer your inquiry.

The term "Electromet" is a registered trade-mark of Union Carbide and Carbon Corporation.

ELECTRO METALLURGICAL COMPANY
A Division of Union Carbide and Carbon Corporation
30 East 42nd Street UCC New York 17, N. Y.
OFFICES: Birmingham • Chicago • Cleveland • Detroit
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In Canada: Electro Metallurgical Company, Division of Union Carbide Canada Limited, Welland, Ontario

Electromet
TRADE-MARK
Ferro-Alloys and Metals

Lasts Longer!

SURVEY

DESCRIPTION OF WORK

Snagging fins and risers from cast-iron pipe fittings

WHEEL

Simonds 24 x 2½ x 12 wheel with Reinforcing Flanges

PERFORMANCE

Good cutting action: no dressing needed. Gave 1/3 to 1/2 longer life than competitive wheels.

SIMONDS
ABRASIVE CO.

SNAGGING WHEELS

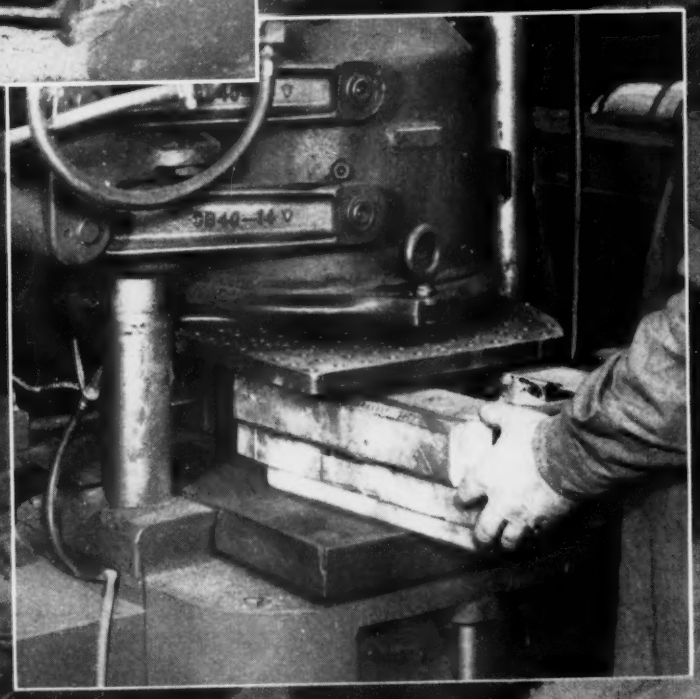
WITH REINFORCING FLANGES

These wheels head into work with real productive bite. Patented Reinforcing Flanges prevent radial cracks . . . add extra safety for the stress of your toughest grinding jobs. Write for bulletin ESA 62.

SIMONDS ABRASIVE COMPANY • PHILADELPHIA 37, PA.

Branch Warehouses: Boston, Detroit, Chicago, Portland, San Francisco • Distributors in Principal Cities
Division of Simonds Saw and Steel Co., Fitchburg, Mass. • Other Simonds Companies: Simonds Steel Mills, Lockport, N.Y., Simonds Canada Saw Co., Ltd., Montreal, Quebec, Lion Grinding Wheels Div., Brockville, Ont. and Simonds Canada Abrasive Co., Ltd., Arvida, Quebec

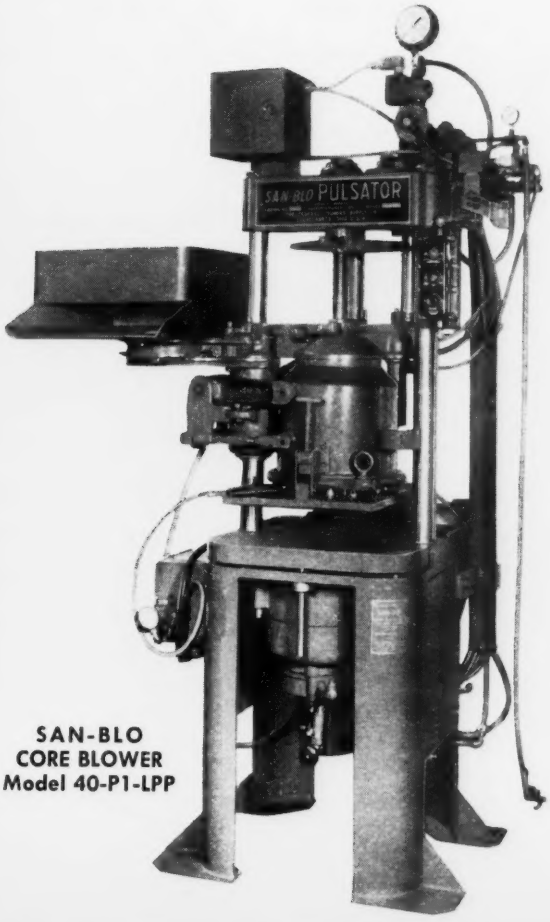
don't ram wooden boxes . . .



when you can blow them . . .

but remember—you'll need a SAN-BLO to do it!!

The SAN-BLO Core Blower, with low pressure prefill and pulsator type blow, is the only Core Blower designed and recommended for blowing wooden as well as metal core boxes!



SAN-BLO CORE BLOWER Model 40-P1-LPP

Now you can have all the advantages of high speed core blowing for *wooden core boxes, TOO!* Because the SAN-BLO will blow high quality cores in the same boxes* you're now ramming—blow them *safely*... with *negligible* core box wear... with *minimum,* (if any) rigging. Here's why:

SAFETY PULSATOR TYPE BLOW consists of 2, 3 or 4 short, quick, ramming blows—rather than the conventional, continuous blow. *Prevents* dangerous pressure build-up within the core box during the blowing cycle ... *eliminates* the possibility of blowing core box apart.

WEAR LOW PRESSURE PREFILL "riddles" a layer of fluffed sand on the bottom of the core box, *before* full ramming pressure is automatically cut-in. *Eliminates* the sand blasting or gouging of the bottom of core box, during the blowing cycle.

RIGGING Federal's new UNIVERSAL, QUICK-CHANGE, BLOW AND VENT PLATE ASSEMBLY *is standard equipment* on all Pulsator model SAN-BLO machines. Blow plates for open-top boxes can now be made up in *less than 10 minutes time,* at a cost of but a *few dollars,* and can be changed on the machine in a *matter of seconds.* Further, since a majority of existing wooden core boxes are open-top, the universal vent plate generally eliminates the necessity of inserting vents in core boxes. As a result, the blowing of short-run cores becomes as economical as production runs.

MORE SAN-BLO FEATURES: "Cyclo-Air" sand chamber with motor-driven agitator and aerating air circuit ...adjustable sand chamber height...air-oil-controlled automatic draw...single-push-button control... wooden and metal core boxes blown on the same machine... cores weighing from a few ounces to full capacity of machine blown with one sand chamber, at maximum blowing efficiency.

To learn more about blowing wooden core boxes safely, efficiently and economically... write our home office and request our representative to call.

* *Most existing wooden core boxes will withstand the clamping and blowing pressures developed by the SAN-BLO core blower.*

FEDERAL

San-Blo Division

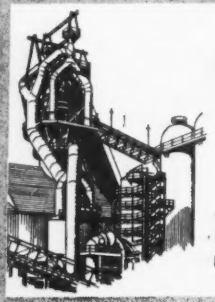
The **FEDERAL FOUNDRY SUPPLY** *Company*

4600 EAST 71st STREET, CLEVELAND 5, OHIO

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

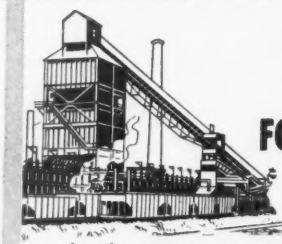
SALES OFFICES IN CHICAGO . DETROIT . LOS ANGELES . MILWAUKEE . NEW YORK

9 Reasons Why Your Foundry Can Cut Costs in the BIRMINGHAM District



High and Low Phosphorus PIG IRON

—available in ample supply from local producers.

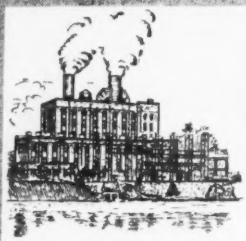


World's Finest FOUNDRY COKE

—in sizes to meet requirements of any cupola operation.

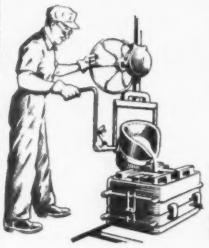
Abundant NATURAL GAS

—at favorable rates in all areas in the district.



Unlimited Low Cost POWER

—distributed by one of the South's largest, most progressive utilities.



Cooperative Native-Born LABOR

—many from families who have worked in foundries for two or three generations.

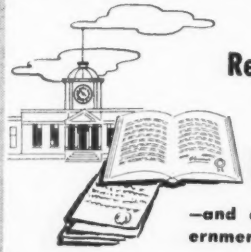
Superior TRANSPORTATION FACILITIES

Rail-Truck-Water-Air

—Birmingham—the South's rail center and trucking headquarters—is likewise served by the Warrior-Tombigbee river system.

Good MOULDING SAND

—prepared in the district for foundry use.



Reasonable TAX RATES

—and cooperative government at all levels.

CENTRAL LOCATION in the Heart of the Growing South

—cuts delivery time and costs to expanding Southern markets.

This unusual combination of manufacturing and distributing advantages is the reason why foundries making rough and precision castings are prospering in Birmingham.

* * * * *

Write this Committee or any of its undersigned members for detailed data on how to cut your foundry costs in this central district of the South.

BIRMINGHAM COMMITTEE OF 100

1914 Sixth Ave., N., Birmingham, Ala.

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Birmingham Trust National Bank

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Chairman Exec. Comm.
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President
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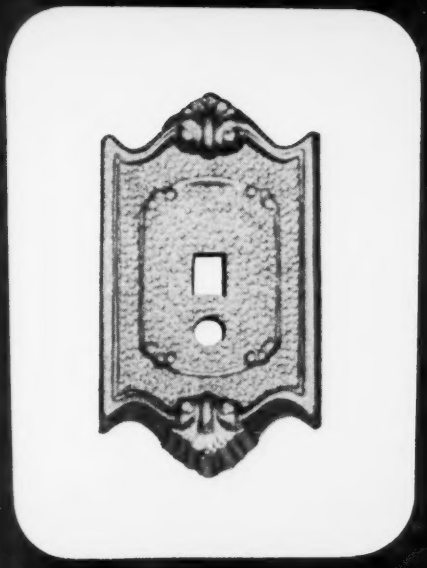
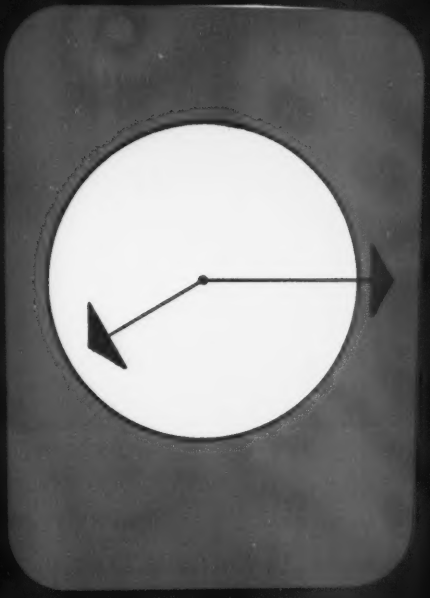
United States Steel Co.

it takes only 15 minutes to do 5 hours' work





with a **WHEELABRATOR®**

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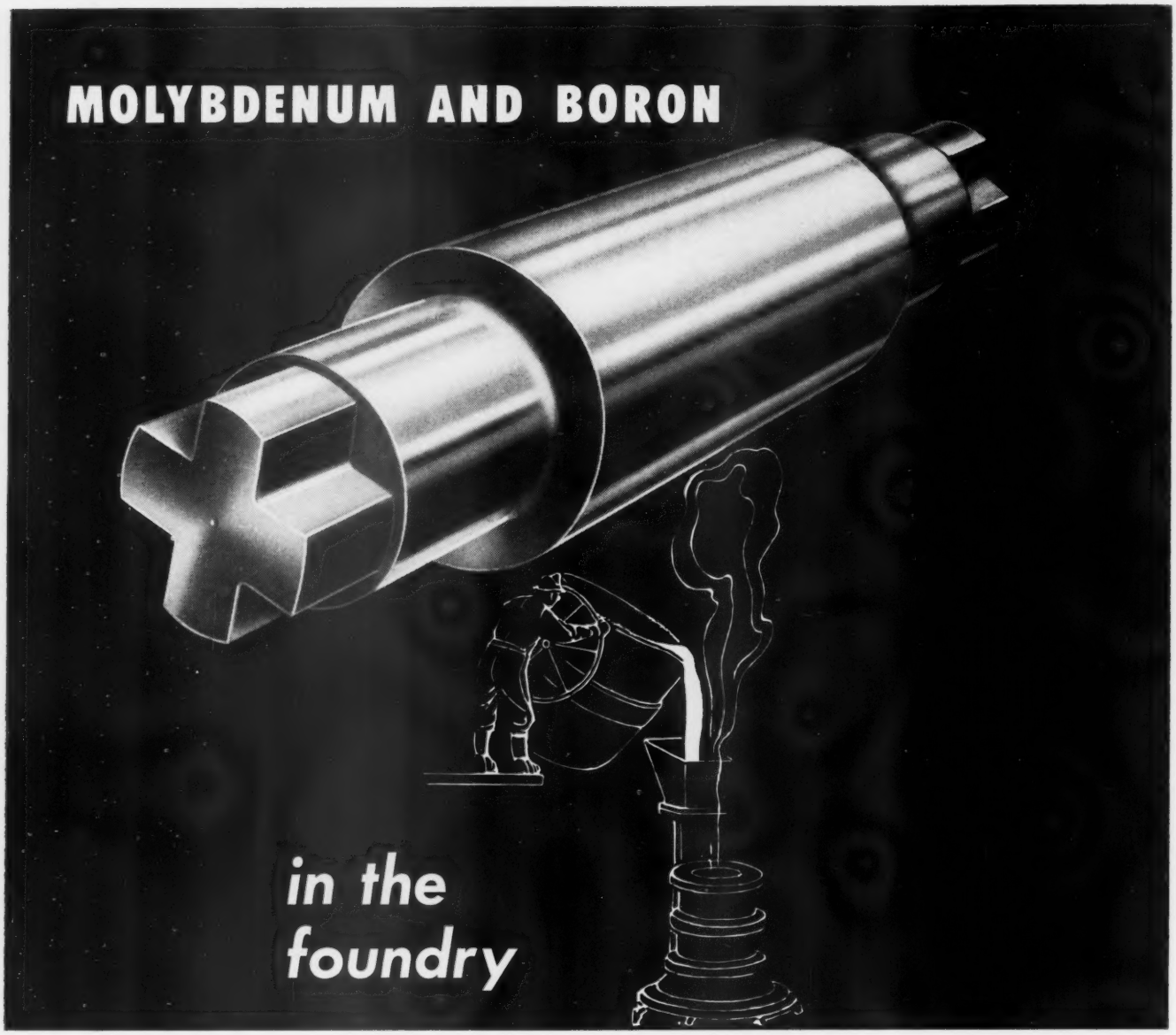

in the foundry

Rolls are among many cast, wrought iron and steel products that have been improved by Molybdenum and Boron. Very small additions, properly introduced, yield surprising results. MCA Molybdenum additions increase the resistance of rolls to breakage, chipping, heat checking and spalling in service. Molybdenum and Boron improve toughness and hardness qualities at both room and higher temperatures.

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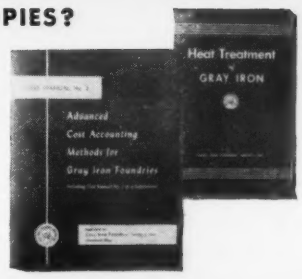

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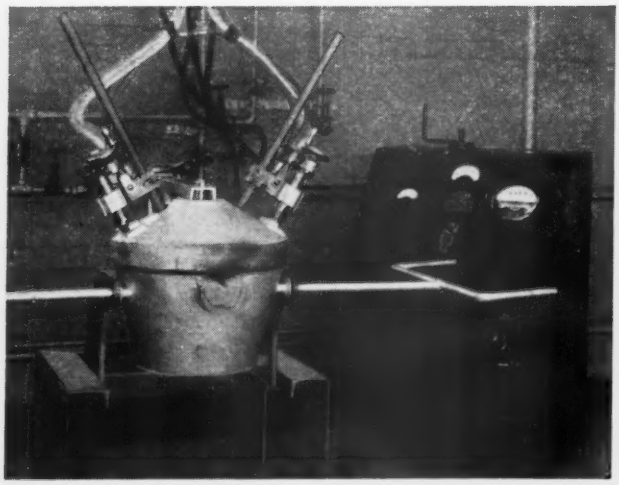
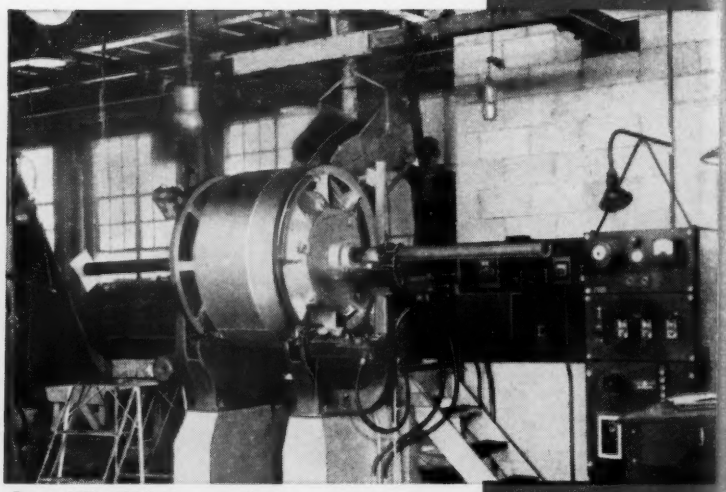
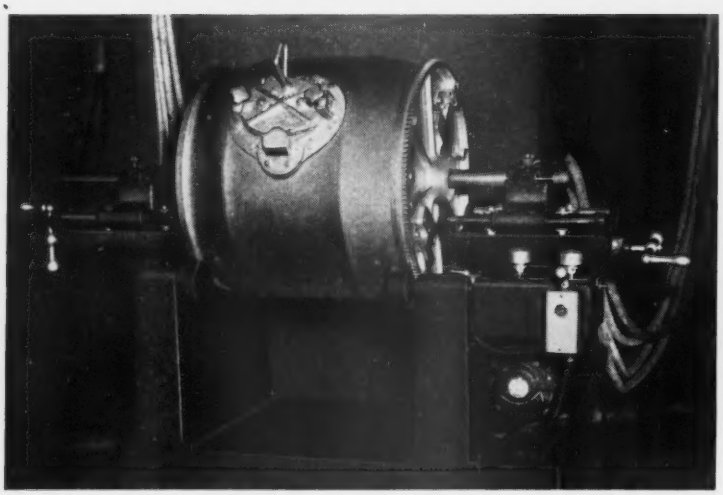


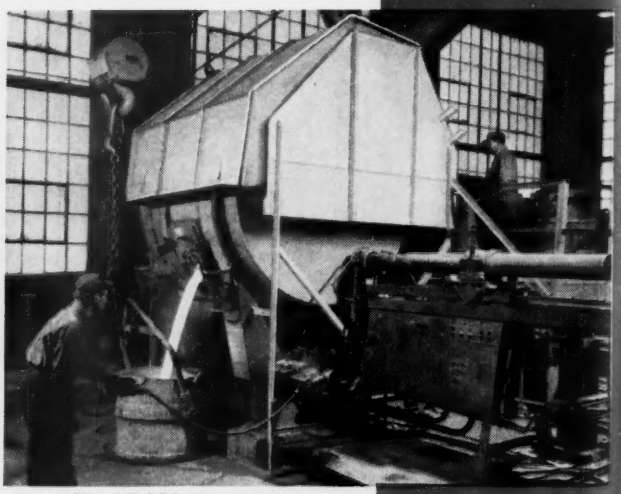
Type PT—15-lb. capacity



Type LFY—700-lb. capacity



Type GMS—60-lb. capacity



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The extreme high heat release rate of the THERMAL burner makes possible the application of this ladle heating installation without altering your existing facilities or production methods.

1. Reduces ladle pre-heating time as much as 75%.

2. Maintains pouring temperatures during continuous casting operations.

3. Can pre-heat or even melt-down a charge within the ladle.

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5. High velocity can actually stir the molten metal.

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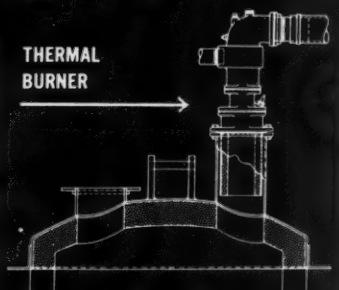
THERMAL ladle heating installations are available complete with ladle covers or ready for mounting to your present cover. All necessary valves, blower, pump, etc., are supplied for immediate application.



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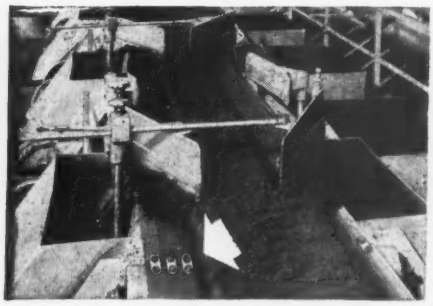
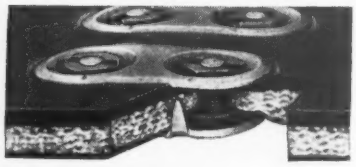


FOR JOINING CONVEYOR BELTS WHERE SCRAPERS AND PLOWS ARE USED



- Especially designed for use in joining foundry conveyor belts.
- Beveled top plates ride snug to belt eliminating interference with plowing and scraping operations.
- Thoroughly tested . . . by several large foundries . . . for four years.
- One size . . . for joining belts 5/16" to 1/2" thick with not more than 500 ft. centers.
- Available in Steel, Monel and Everdur.

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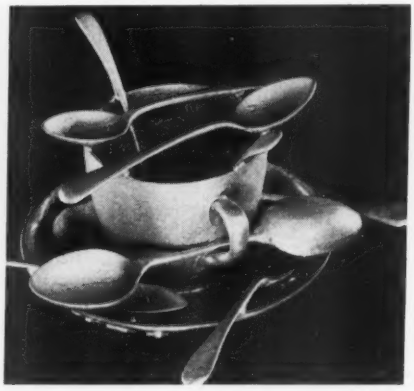
Who'll Make It Ten?

TO THE EDITORS:

In FOUNDRY of September, 1953 you published a photograph of a cup, saucer and four spoons which I had molded and cast in one piece. This was very kind of you, and I thought you might be interested in my latest effort—cup, saucer, eight spoons plus a double-ended spoon through the handle (won't come out, obviously) molded and cast in one piece in aluminium — a photograph of which is enclosed and which you



have my permission to reproduce if you so wish.

Just in case there is any question of trickery I have two x-ray films, taken from different angles, of this piece, and I am pleased to say that, except for two very small sand inclusions, they show a perfect casting.

FRANCIS D. ROPER
Instructor

National Foundry Craft
Training Centre
Phoenix St.
West Bromwich, England

* * *

Praises Editorial on Safety

TO THE EDITORS:

Congratulations for the fine editorial in the December issue of your outstanding magazine, FOUNDRY, entitled "Why Take Chances." Let's hope the management of every foundry will heed its contents and act accordingly; many need the wise counsel therein contained.

During the past few years, it has been very discouraging to tell the public about our great industry and still have a few operating under adverse working conditions.

The foundries, during the past ten to twenty years, have advanced tremendously and will continue to do so with men such as you campaigning their cause. Educational committees of the various technical societies have also contributed greatly to the improvement of conditions and product.

We can't let the failings of a few discourage us, however, and isn't it a fact that only education will correct the negligence of a small minority of the human race who are affected with the I don't care attitude, whether in their work, home, or personal habits.

Improved technology will continue in our industry and nothing will stimulate it more than improved working conditions.

It is my opinion that those who do not clean up their foundries will be left holding an empty bag.

EARL M. STRICK
National Chairman
Youth Encouragement
Committee, AFS

Erie Malleable Iron Co.
Erie, Pa.

* * *

Against Government Control

TO THE EDITORS:

We have found the Molding Sand Symposium in the November issue very interesting.

While commending you for the sand symposium we feel compelled to object very strongly to your editorial on the scrap situation.

We feel that you are suggesting a basically wrong thing in extending government controls and we cannot advocate government bowing to the wishes of minority, but highly vocal pressure groups.

EARL BEYERLEIN
Casting Quality Control

J. I. Case Co.
Tractor Works
Racine, Wis.

* * *

Available in Spain

TO THE EDITORS:

We note in the January issue you have an inquiry from someone in Spain about exothermic mold materials, with the comment that they appear to be unobtainable in Spain because of difficulties of importation.

We have just managed to send the first shipment of our epoxy resin casting compound Metalset A101 to our representatives in Madrid—Productos Carlen, Pentoja, 4 (Prosperidad).

HENRY M. SILVER
President

Smooth-On Mfg. Co.
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- Practically every new alloy has been developed in an AJAX-NORTHRUP furnace.

- Scores of large industries have grown around the nucleus of a simple AJAX-NORTHRUP laboratory installation.

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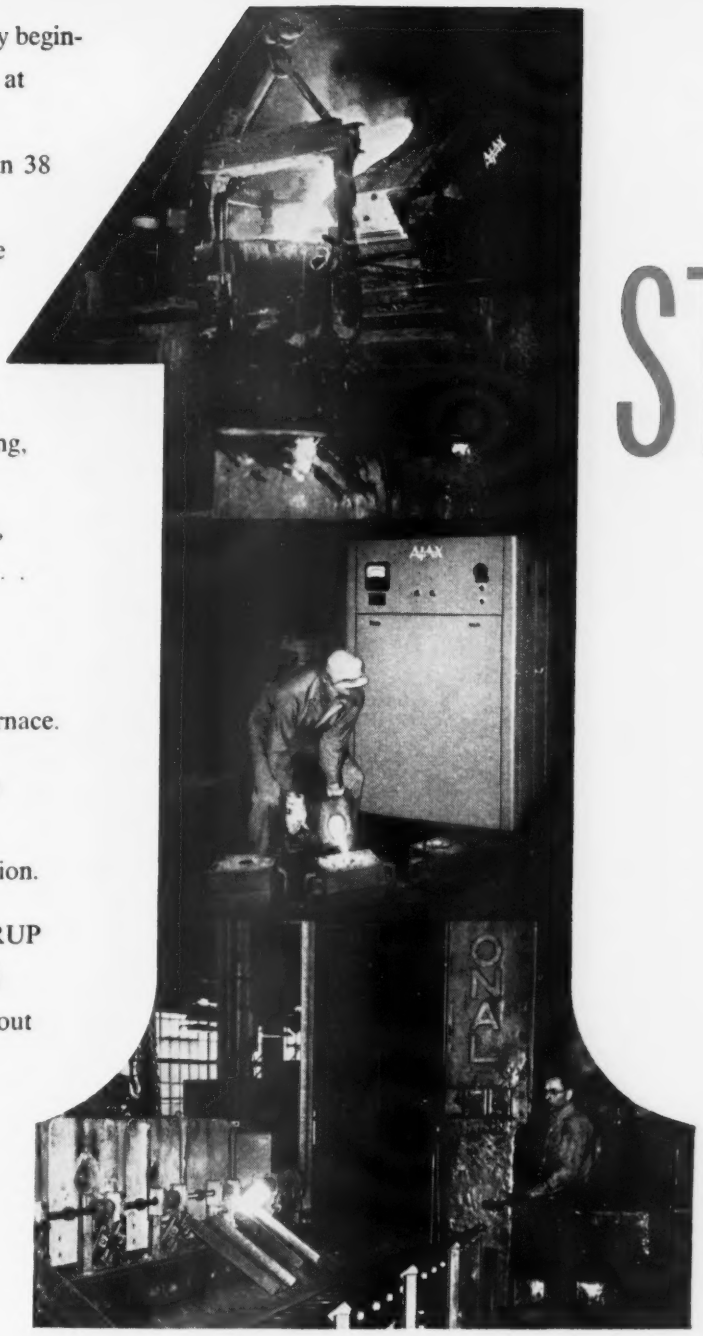
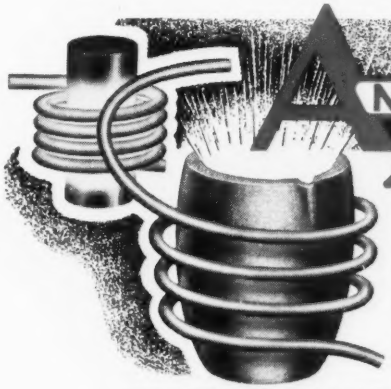
Ajax engineers can show you how this *experience,* which has maintained leadership over the years, can bring you important day-to-day benefits . . . in even your toughest heating or melting application. Telephone or write today.



1ST



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Sterling FLASKS are FIRST because they LAST

Cross section of a Sterling Heavy Duty Rolled-Steel Flask. Note the heavy sand flanges with full width bearing, cannot curl under jolt action.

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Let's Be Ready

World tensions involving the United States continue. While the struggle for power among Red leaders may lessen the probability of an early war with Russia, some experts believe Moscow may attempt to push Red China into a war with us. The return to toughness on the part of the Reds also may indicate intensified cold war activities in other parts of the world.

With this continuing unrest, and a future clouded with some uncertainty, foundries and government should take steps to strengthen the industry and thus prepare for maximum service in case of an emergency.

First of all, prices of castings should be stabilized to provide a return covering cost of production plus a fair profit. Last year's declining business and unfair pressure from some large buyers of castings resulted in considerable unintelligent pricing. Any national emergency with its accompanying price controls, would find many foundries in serious difficulties. Therefore, realistic pricing should be the present goal of every foundry.

A record of the various types of castings produced during World War II and the Korean War would be valuable. Such information would aid committees representing the industry in proving the essentiality of all branches of the industry in the production of a wide range of military requirements and could avoid the closing of some plants which might later be needed for some types of production.

Complete information on the ability of various foundries to produce should be made available to government by trade associations. Such information will prevent government procurement agencies from charging that it is not possible for them to find where certain types of castings can be purchased. Also, it will help materially in getting castings orders in the plants best prepared to do the particular type of work. The Non-Ferrous Founders' Society has just published a valuable Buyers' Guide for that purpose, and other associations have provided government with similar information. But it should be done by all branches of the industry.

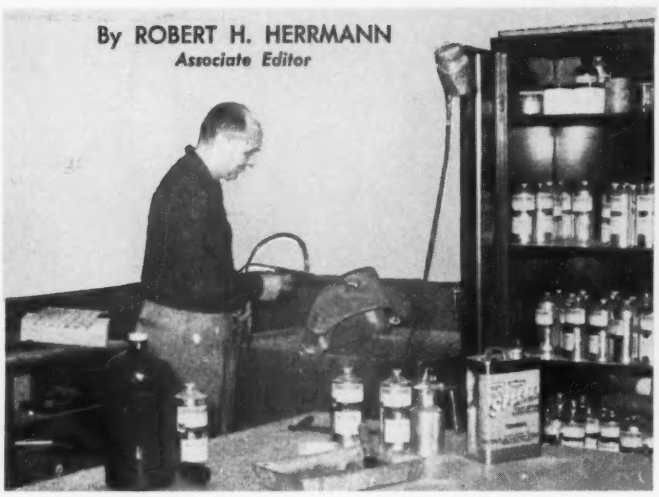
Government has at last recognized the importance of having staff members of related trade associations on government-industry advisory committees. The trade association has more information on the facilities and needs of its particular industry than any other source. The staff executives have this information, they understand the industry thoroughly and can render great service to both government and industry on such committees. Therefore, the Department of Commerce should use this assistance to the fullest, regardless of the recent unfair and uncalled for criticism of Stanley Barnes of the Department of Justice and Congressman Celler, chairman of the House Judiciary Subcommittee.

Last, but not least, the exportation of both ferrous and nonferrous scrap should be eliminated. The unlimited exportation of fine scrap in both categories, as now permitted by the Department of Commerce, is nothing short of criminal in the light of our past experiences. It should be stopped at once.

Frank G. Steinebach

Editor

By ROBERT H. HERRMANN
Associate Editor



Part is sprayed with brittle lacquer prior to stress analysis in the development laboratory

Part is clamped in a device for applying load to develop strain patterns in lacquer coating

Nondestructive Testing Aids

CASTING DESIGN

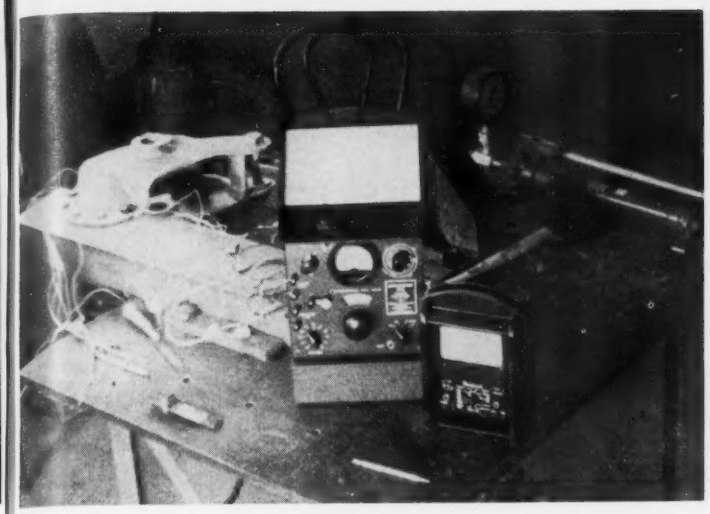
THERE are several ways to arrive at a properly designed casting. And there are many ways to test that design before casting production starts. The use of nondestructive testing methods for this purpose is being recognized with increasing respect. These techniques include radiographic, magnetic particle and fluorescent and visible dye penetrant inspections.

A newer tool, particularly useful in designing high-strength, minimum weight castings with desirable uniform stress characteristics, is brittle lacquer, which indicates stress areas on a casting. Somewhat more accurate stress values can be obtained when the lacquer is used in conjunction with SR-4 strain gages and a strain indicator.

Before one can design or redesign a part, the customer's needs must be known. The best way to determine those is to ask him. For what will the part be used? How many does he want? How strong must the part be? Is weight a factor? Cost? Is the present design all right functionally? Structurally? If it is a casting, is it easy to cast? And if it isn't a casting, why cast it?

Numerous advantages characterize the foundry process. It is the most direct method of producing intricate or simple parts. In some cases production of satisfactory parts is almost impossible by any method other than the casting process. The wide range of mechanical properties obtainable meets a variety of customer needs. Cast parts can have a streamlined shape—good eye appeal. But for certain parts, other factors may have strong influence. Maybe the quantity needed is too small. Cost of design and pattern development may be out of proportion to the part's useful value. Maybe required foundry practice is impractical. Then why cast it? Why take on impossible headaches, make an unhappy customer, create bad will for the industry?

Now You Can Start—When this background material is known and the decision has been made that the part should be cast, work on the design can start. Here is the way Superior Steel & Malleable Castings Co., Benton Harbor, Mich., approaches development of a casting design. After meeting with the customer to determine his needs, the product development engineer—in the case of a redesign project—will test the present part. It is tested in its own environment or under simulated conditions. Tests are made with Stresscoat, a brittle lacquer, or SR-4 strain gages or both. These tools show, directly, the stress to which the part is subjected. Thus the engineer has the necessary facts for proper redesigning.



Stress values are determined more accurately with SR-4 strain gages. Setup is shown above

From here on the work for new and redesign work is the same. The engineer sketches, freehand, a proposed design. Characteristic of these sketches is the blending or streamlining of sections difficult and sometimes impossible to show on an engineering drawing. Next, a mock-up of the part is made. Often this work starts before the sketch is complete. In fact, changes are made on the sketch as work progresses.

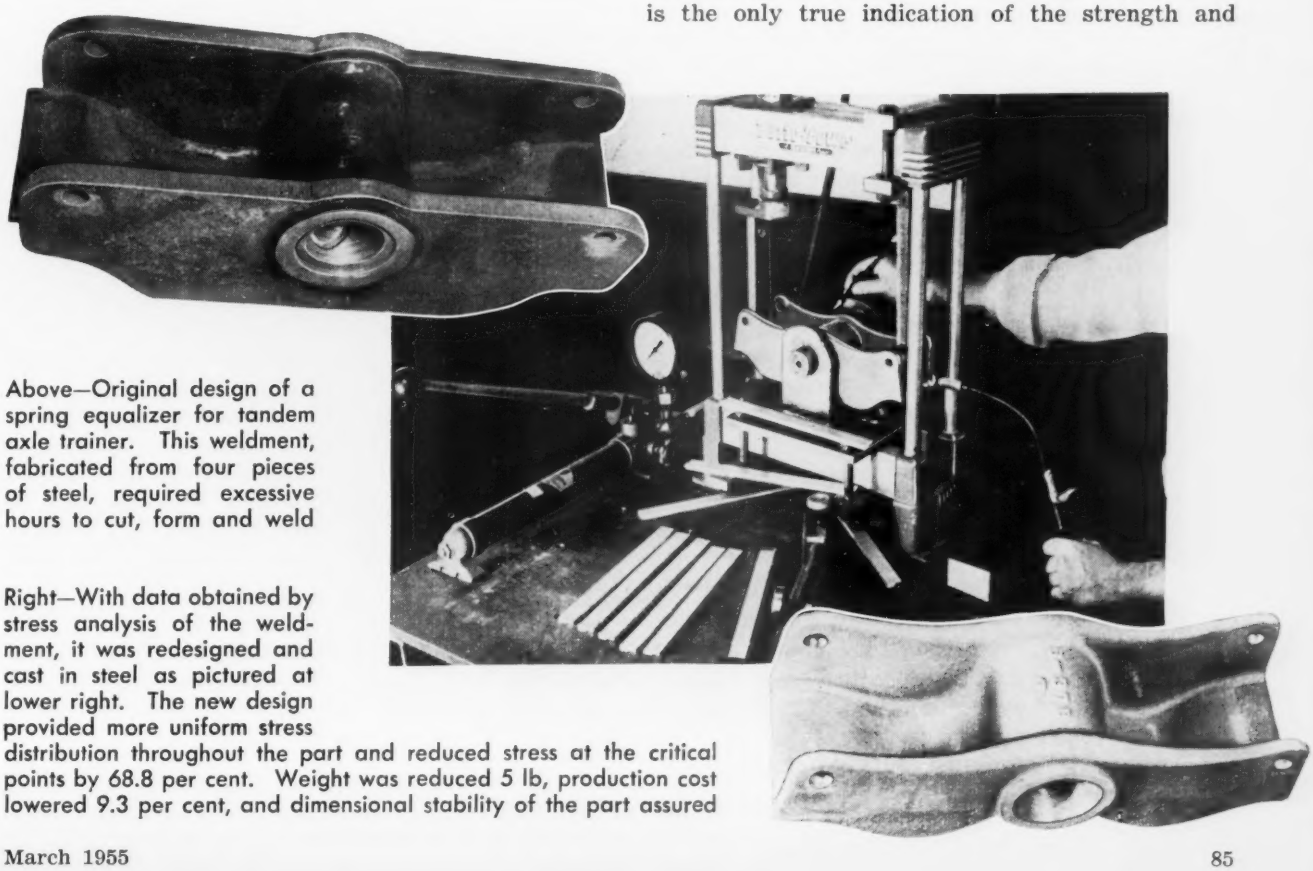
Wood and plasticine clay are used to make the mock-up. The engineer works the clay with his hands like a potter, shaping the piece by eye as his design experience indicates. Because the mock-up is a three-dimensional facsimile of the finished piece, its design can be understood by anyone. This is important in discussions with pattern shop and foundry people who work with the designer in planning how the pattern should be laid out and how the part will be cast. During these meetings suggestions may be made for design changes that will permit better pattern and foundry practices. It is easy to make changes by adding or scraping off clay. In other words, the mock-up can keep step with the thinking of the men concerned.

Superior Steel believes that heads and gates should be considered as part of the casting—not as separate units. Often gates and runners are incorporated in the body of the casting. In this way, directional solidification is aided. Then, too, yield is increased and the handling of remelt metal reduced.

When design, patternmaking and foundry people are satisfied that the casting mock-up and gating system is satisfactory, a few sample castings are made, using the mock-up for a pattern. The product design engineer follows closely coremaking, molding and cleaning operations on the sample castings. Suggestions for design changes to simplify or improve any of these operations are considered and, if possible, made.

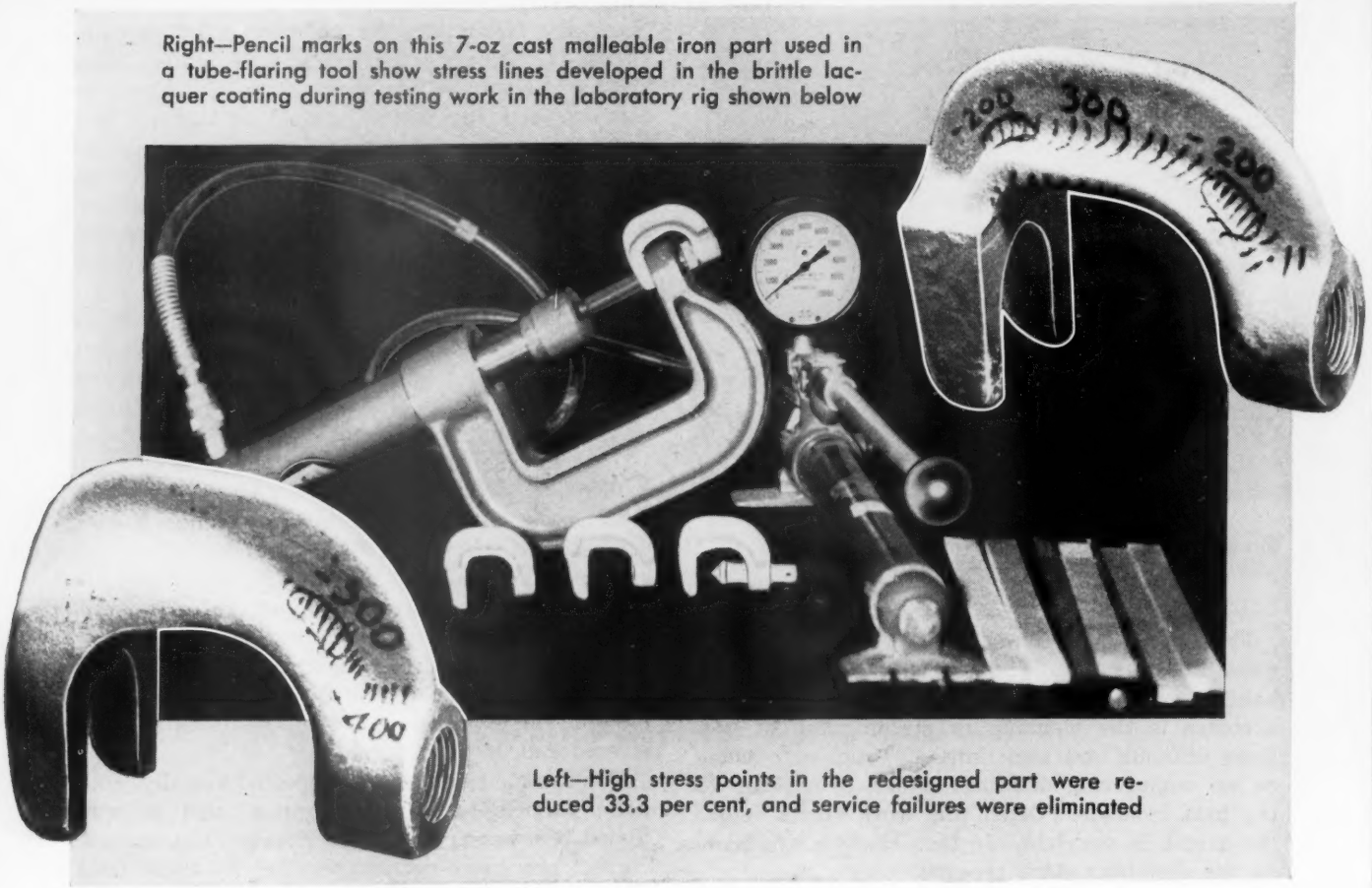
The sample castings are inspected visually, magnetic particle tested, radiographed and pressure tested if necessary. Design changes are made to correct any basic defects revealed by these tests.

Machine Before Testing—Sound, sample castings then are machined as they would be for their intended application. Only a machined casting truly represents the characteristics of the component involved. Many times an otherwise excellent casting design is ruined by machining notch effect into the final part. Testing of the machined part, then, is the only true indication of the strength and



Above—Original design of a spring equalizer for tandem axle trainer. This weldment, fabricated from four pieces of steel, required excessive hours to cut, form and weld

Right—With data obtained by stress analysis of the weldment, it was redesigned and cast in steel as pictured at lower right. The new design provided more uniform stress distribution throughout the part and reduced stress at the critical points by 68.8 per cent. Weight was reduced 5 lb, production cost lowered 9.3 per cent, and dimensional stability of the part assured



Right—Pencil marks on this 7-oz cast malleable iron part used in a tube-flaring tool show stress lines developed in the brittle lacquer coating during testing work in the laboratory rig shown below

Left—High stress points in the redesigned part were reduced 33.3 per cent, and service failures were eliminated

serviceability of a design.

New and redesigned castings produced at Superior are tested for stress analysis in the product development laboratory. Here the castings are cleaned in a four-step process. Castings must be free of loose scale, grease, oil and paint so that tests will give true and accurate results. At Superior Steel the castings are sprayed or brushed with used lacquer thinner, then with clear thinner. This is followed by a bath in used and clear carbon tetrachloride. Cleaning is done over a ventilated tank which has an expanded metal grating across the top on which the castings may be placed. Castings also are sprayed here with brittle lacquer in preparation for testing. Aluminum calibration strips are coated at the same time. An undercoating is applied first and allowed to dry. Then the finish coating is applied. Great care must be taken during spraying to obtain a smooth coating of uniform thickness.

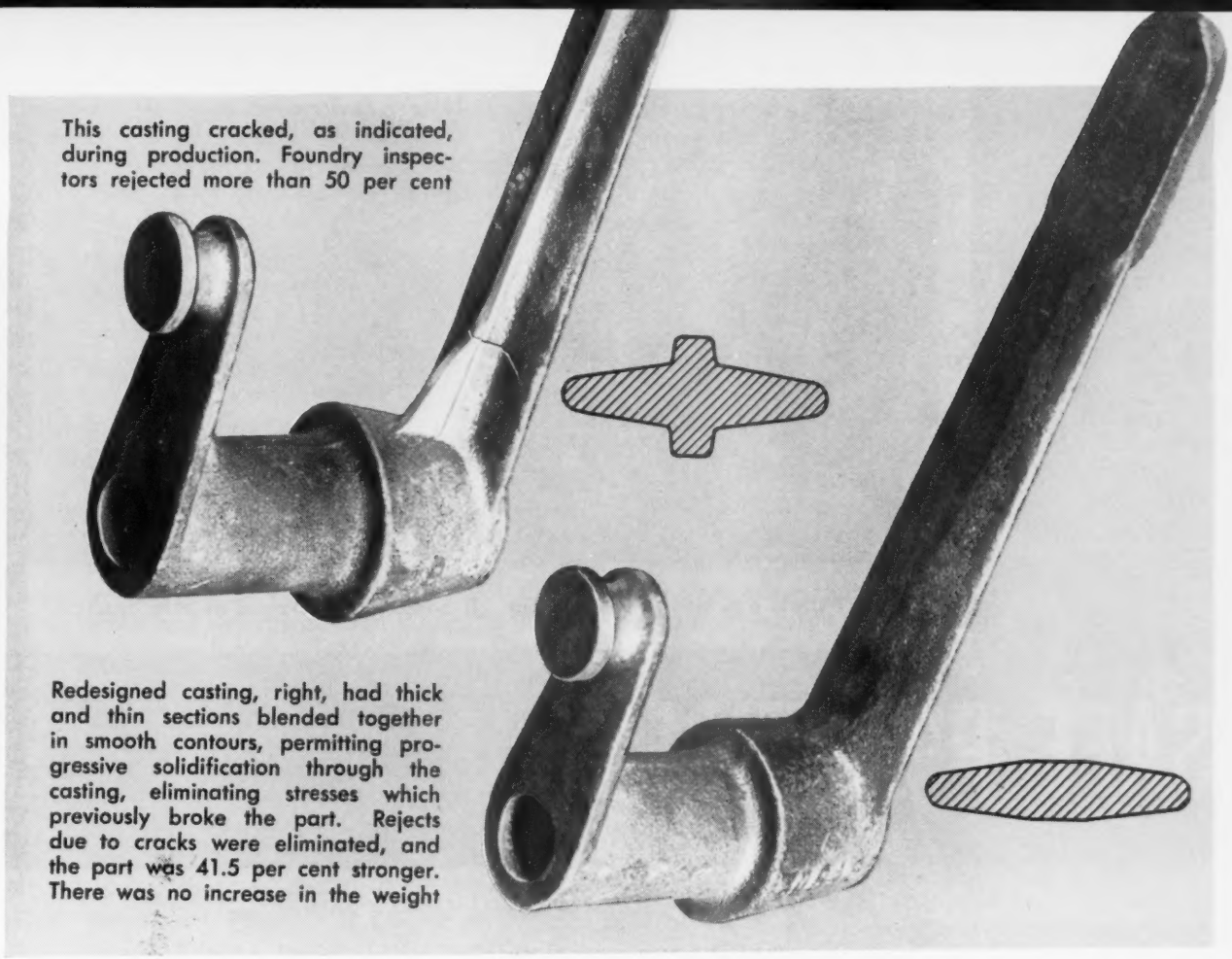
Coatings are available in several types, each compounded, primarily, for the room temperature and humidity at which tests will be conducted. Thus good results are obtainable under varying conditions. Ideally, of course, the test room should be kept at constant temperature and humidity. Practically, however, satisfactory results are obtained otherwise. At Superior Steel no direct control is maintained over humidity, but humidity conditions are considered in selecting a coating. Room temperature is controlled during testing within plus or minus 1½° F.

Now comes the ticklish part of the job. The casting to be tested must be mounted in the testing rig without touching the coating. This is a matter of extremely careful handling. After mounting, the casting and calibration strip are allowed to dry for about 12 hr at 100° F.

Equipment in the test room need not be elaborate. A sturdy table, preferably metal, some clamping devices and a hydraulic jack for applying loads are all that is required. Large or intricate castings may require special clamping fixtures, although these may be adjustable to handle a variety of castings.

When the coating is dry, the calibration strip is placed in a strain indicating scale and a known load applied. Cracks thus obtained in the brittle coating form a pattern which later can be compared with the strain pattern on the test piece.

Loads simulating those which will be encountered under actual service conditions are applied to the casting with the hydraulic jack. Cracking of the brittle coating forms fine, hairline patterns at right angles to the maximum principal tensile strain. Detecting formation of the first strain pattern to appear in the coating and calibration of the coating at the time of testing is important in determining accurate quantitative values. Strain patterns formed on the casting are matched with those on the calibration strip and values read from the strain scale. Apparent values of stress then are computed by multiplying the strain value by the tension modulus of elasticity of the metal of



This casting cracked, as indicated, during production. Foundry inspectors rejected more than 50 per cent

Redesigned casting, right, had thick and thin sections blended together in smooth contours, permitting progressive solidification through the casting, eliminating stresses which previously broke the part. Rejects due to cracks were eliminated, and the part was 41.5 per cent stronger. There was no increase in the weight

which the casting has been poured.

Stressed Areas Disclosed—The brittle lacquer technique shows where strain is concentrated or how it is dispersed through the casting. Generally, greater dispersement means a stronger casting—one that will have a longer service life. With wide stress dispersement a greater portion of the casting serves a functional purpose, and the customer gets the highest possible strength per available pound of casting. The perfect design, of course, would be one in which every square inch and every ounce of casting are under equal stress. However, such a design never has been conceived. Stress computed from the strain lines will have an accuracy within about 15 per cent. In the opinion of R. J. Franck, product development engineer at Superior Steel, brittle lacquer techniques often provide ample data for developing good casting design.

Accuracy of ± 2 per cent in determining stresses can be achieved with SR-4 resistance wire strain gages. These gages are electrical grids formed by fine, hair-like wires. They are cemented to the casting surface at those points indicated by brittle lacquer coatings as being points of stress. Heavier wire leads from the gages are connected to an electrical strain indicator. This may be a dial type unit or pen recording unit. Resistance to the electrical current passing through the gages is calibrated in micro inches per inch and shown on the instrument. The amount of resistance differs as the wire grid is stretched when load is applied to the casting.

Use of these strain indicating test methods show if the casting is designed to carry the loads to which it will be subjected in service. If the tests show that design changes must be made to improve stress distribution, this is done by altering the mock-up to increase or decrease casting section thicknesses. Then new castings are made and the test procedure repeated.

When testing has been completed, engineering drawings and a report of the work done are sent, with the castings, to the customer for approval. In nearly all cases, castings designed through use of experimental stress analysis are of minimum weight and maximum strength. Excess, "beef up" metal has been eliminated through knowledge of exactly where and how the part will be stressed in service. The extent to which "beefing up" sometimes occurs is shown by the fact that some jobs received by Superior have had an error of 800 per cent in the engineer's estimate of the strength required in the casting.

Product engineering methods reduce excess casting weight and still provide a casting of ample strength for its intended application. A better part is produced for the customer. And since good casting design leads to good foundry practice, production troubles and scrap are reduced. Thus costs are lowered, sometimes as much as 40 per cent, resulting in savings to the customer and the foundry. Castings are raised to the level of engineered parts and may be sold as such rather than as so many pounds of metal.

By CLYDE R. ST. JOHN
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Safety starts with good housekeeping. It brings an awareness of safe practice

SAFE PRACTICES in the Nonferrous Foundry

THE biggest hazard in any plant engaged in melting and casting light metals is that of molten metal explosions.

Explosions of molten metal are caused by the entrapment of moisture. The entrapment is a necessary feature. Water can be poured on top of molten metal and no explosion will result, but when the moisture is trapped under the molten metal a violent explosion results. This is caused by the formation of steam.

When water changes from the liquid state to steam, it expands 1800 times. One cubic inch of liquid water will expand to slightly over one cubic foot of steam. This expansion has enough force to cause an explosion.

A case occurred in one plant where a box of purchased extrusion butt scrap was placed in the charging well of a furnace. It is estimated approximately 400 pounds of metal was blown out of the charge well, two butts were blown to the roof of the building, a distance of 30 feet and then fell back to the floor narrowly missing employees on the floor below. The charge truck was blown backward by the force of the explosion. In this case it could only be surmised that an amount of water had accumulated in the bottom of the tote box.

Look Out for Ice—In another plant pig was being charged into the melting hearth of a reverberatory furnace and an explosion resulted which blew pig out the door. Examination of other pigs from the storage area revealed that moisture was frozen in the cracks between the pigs which vaporized when placed in the furnace. The furnace helper received a number of small burns.

In another case of explosions when charging pig, the pig was found to be dry. This happened for several days, and we finally discovered that the cause was still moisture. The pig was being used shortly after being received in cold weather. The furnace was gas fired, and as the pigs were put in the furnace atmosphere, the moisture was condensed from the combustion products. It was found that the pig had to be held in the furnace above the molten metal for a minimum of 20 seconds so the pig would heat up and evaporate the moisture.

An explosion throwing molten metal from a die casting mold just after starting a drop severely burned a pourer. The explosion was believed to have been caused by moisture on the bottom block. The pourer's helper had not blown the block dry with compressed air before starting the drop.

Ladle Must Be Dry—Another explosion occurred when a hand ladle was immersed into a crucible to remove metal for a sample. The employee was burned about the face and got particles in his eyes. It was found that the ladle was cold and moist. This same incident occurred in another plant where the only employee injured was one standing about 30 feet away who had a splash go down the back of his shirt and sustained a second-degree burn.

An accident has both a source and a cause. The source of the accident means a condition which must have a cause. The cause of the accident means some individual or individuals acted incorrectly.

The source of all metal explosions is the entrapment of moisture which some individual caused in-

advertently to be placed with the metal by acting incorrectly in his handling of the metal.

In 1952, we had a lost-time accident when a tote box of mill scrap was charged into a furnace. Molten metal blew to the ceiling of the building, about 40 feet high, and covered an area of about 400 square feet. The charging truck was covered with metal, and the operator was burned from head to foot and required extended hospitalization and a rehabilitation program of about a year.

We searched the area for a source of the explosion. In the metal which came from the center of the explosion area we found pieces of a soft drink bottle. This we knew must have contained moisture. The charge ticket showed that the scrap had come from an end trimming saw in a fabricating department. We then knew the cause; an employee had put his partially empty soft drink bottle in the tote box rather than placing it in the rack by the dispensing machine. We used this incident as subject matter of safety talks to all employees in the plant.

Poor Supervision—The investigation of another accident revealed a cause which was attributed to poor supervision.

A crane operator picked up a crucible of molten metal to pour into molds. As he raised the crucible to move from one mold to the next, it tilted and spilled about 2500 pounds of molten metal on the floor.

The source was found to be a spout cover which became caught between two molds; there was no hook to hold it. In this case supervision had not adequately engineered this equipment to protect the employees.

Sources of accidents must be controlled. Some causes are not easy to control; therefore, one must be always vigilant for the sources.

All scrap must be very carefully inspected to insure that it is dry and not excessively oily. Process scrap must be checked for the same reason. On purchased scrap the cause cannot be controlled, so we must search carefully for sources. Causes of sources within one's own plant must be controlled by a thorough educational program of one's employees.

Charging Needs Planning—The charging of the metal needs carefully thought out safe practices and equipment. We had a number of accidents caused by charging metal with a fork truck. Splashing of molten metal, which happened when the solid metal fell over the door ledge, was quite dangerous. We designed a truck with long booms containing flaps which hold the pig until it is inside the furnace, at which time they are rotated and drop the pig slowly and easily into the molten metal. We also put a shield with tempered glass windows in front of the truck operator in case explosions or splashing did occur. As an added incentive, the wear and tear on both the truck and the furnace was greatly reduced, so this is a case where a safer practice also saved money.

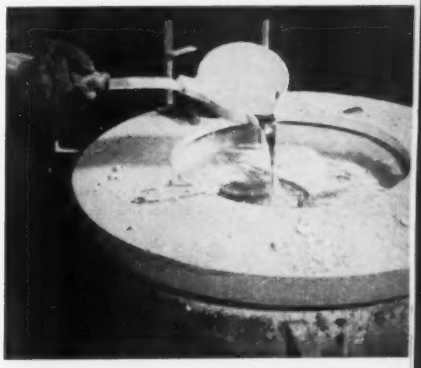
The furnace and surrounding area should be color-code painted and clean. This is conducive to safe practices. The piping and fluxing gases and control mechanism must be painted.

During pouring, extreme care must be taken to insure that all equipment is dry. Pouring troughs or ladles must be preheated to prevent entrapment of moisture. The next precaution is to insure that splashing or spilling of molten metal does not take place. The equipment must be top shape and education of the personnel in the correct procedures is mandatory. Again, the area must be clean and orderly.

Start with Good Housekeeping—The first thing needed to bring an awareness of safe practices is to provide a clean and orderly plant. The effect of this on the quality of the product produced is an important, but another, story. It is practically impossible to promote interest in safety under surroundings other than clean and orderly, especially a plant where the personnel has not had a great many years of experience.

Of course, talking safety and good housekeeping cannot do the job alone. The hazards must be removed.

Formal reporting of all accidents, no matter how minor, is essential to a good safety program. Statistical analysis of our reports showed that 60 per cent of the burns were caused by handling hot or molten metal, with the other 40 per cent coming from bumping or touching fixed objects or from being struck by a hot object. This indicates that in addition to the program of controlling sources and causes of explosions, one must study the equipment to eliminate hazards. Protective insulation of fixed objects can eliminate many hazards.



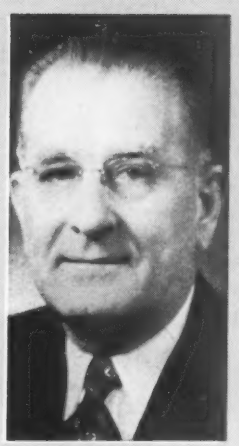
Treat molten metal with respect. Explosions caused by entrapped moisture constitute a major hazard in foundries

All recommendations and safety policies should be reduced to writing. Once committed to writing they must have the backing of all members of management or they will not be of any use. The line foremen must administer the procedures, and he cannot be successful unless he has help.

You can help to reduce accidents, improve product quality and provide a healthier and happier group of employees by 1) backing the line foreman in his attempts to educate his men in safe practices, 2) providing him the interest of all in awareness of the need for good housekeeping and the elimination of hazards.

Editor's Note: This paper was presented at the 42nd annual meeting of the National Safety Council, held in Chicago, Oct. 18-22, 1954.

RECLAIMING



After an analysis of pertinent factors, Oberdorfer Foundries recently installed a core sand reclamation system. This paper defines those factors and describes the system

By WILLIAM D. DUNN
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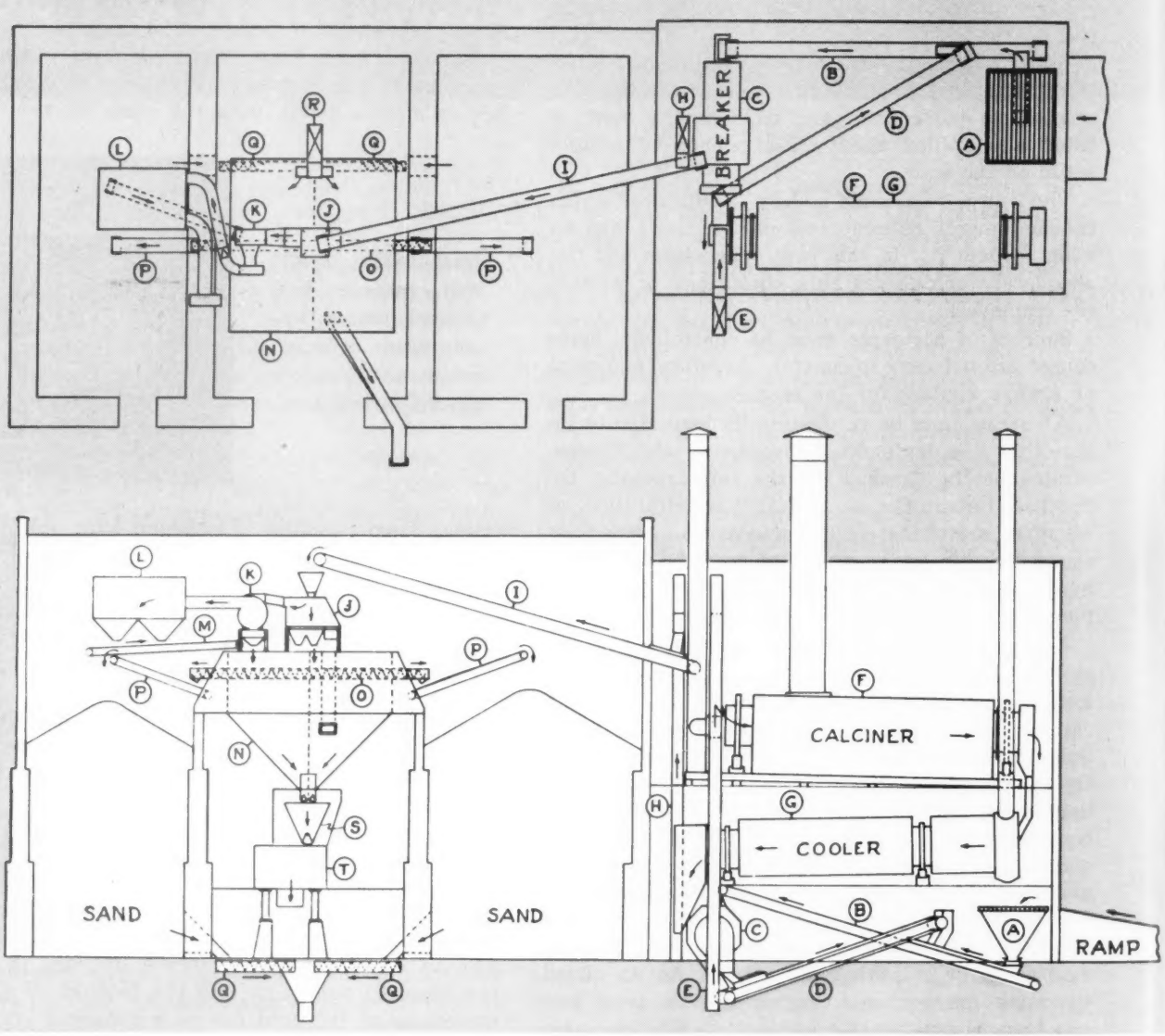


Schematic diagram shows layout of parts of the core sand reclamation system. Overhead view is at top, side view below. See table on next page for symbols

CORE SAND

Exterior view shows receiving end of hopper to which sand is brought by truck or front loader

INSTALLATION of a core sand reclamation system in a nonferrous foundry can be a worthwhile investment, but a number of factors should be considered and analyzed before such an installation is made. These factors involve, of course, determining the cost of reclaiming sand as opposed to the cost of new sand. Sand to be reclaimed should include any that has accumulated at the disposal dump as well as sand in process.

Cost of new sand should include these items:

1. Cost per ton of new sand
2. Freight or trucking rates
3. Unloading cost in the storage yard
4. Transportation of sand to mixing department
5. Transportation of sand to drying equipment, if any
6. Drying costs, if any
7. Investment tied up in winter stock piles
8. Transportation of used sand to disposal dump
9. Land required for dumping, including any which may have to be acquired away from the foundry
10. Loss of such metal as chills, spillage, gates and sprues carried to the dump in used sand. (This loss can be considerable in a nonferrous foundry, but is avoided when sand is reclaimed.)

A—Storage hopper
B—Conveyor belt
C—Breaker barrel
D—Picking belt
E—Bucket elevator
F—Calciner
G—Cooler
H—Bucket elevator
I—Belt conveyor
J—Classifier
K—Skimmer precleaner
L—Dust collector
M—Belt conveyor
N—Steel bins
O—Screw conveyor
P—Conveyor belts
Q—Screw conveyors
R—Bucket elevator
S—Weigh hoppers
T—Mixer

After analysis of these points, Oberdorfer Foundries Inc., Syracuse, N. Y., decided that a core sand reclamation system would be practical for its operation. Consequently the company has had installed a system designed to process 10 tons of reclaimed core sand per hour by calcination.

Sand processed is composed of a mixture of two grades of core sand (60-screen and 180-screen, blended) from the core knockout station in the foundry and of old core sand which has accumulated in the refuse disposal yard and is to be reclaimed. Sand from these sources is transported by truck or front-end loader to the truck storage hopper marked A on the schematic drawing shown in the layout on the facing page.

This hopper is 7 ft 8 in. x 10 ft and 4 ft 6 in. high over-all. At the top of the hopper, 5-in. I-beams spaced about 6 in. apart between flanges form a floor adequate to support normal truck loads and provide enough space for sand and lumps to pass through.

The mixture of sand, broken cores, chills and other metal is fed onto a conveyor belt (B) by a vibrating feeder, a flat pan trough 2 ft wide and 5 ft long. A selenium rectifier with a rheostat control regulates the tonnage of sand fed to subsequent units in the system.

Breaker Barrel—Conveyor belt B moves the material to the breaker barrel (C), which reduces the lumps of core sand to individual grain size. In this unit, the 48-in. jacketed breaker screen is 12 ft 6 in. long and will handle the system capacity when operating at 15.6 rpm. The screen cylinder is designed with internal spirals for retarding the travel of lumps through the screen and with special angles (washboard construction) for breaking the lumps. The jacketed screen is built around this washboard section. It screens the sand before delivering it to an 18-in.-wide conveyor belt, which is under the breaker barrel. The belt delivers the individual-grain sized sand to a bucket elevator (E) which raises it to the calciner (F).

Lumps that are not broken up in their first travel through the breaker barrel screen are discharged onto a picking belt (D). These lumps consist of core sand or of such tailings as chills and miscellaneous aluminum and brass. Chills and other metal are picked off as the belt passes in front of the operator, who is located so that he can pick material off either belt B or belt D and deposit it in tote boxes. The core lumps are recirculated through the breaker barrel until they have been reduced to grain size and then are sent to the calciner.

Calciner—The calciner consists of a rotary alloy tube inclined slightly to the horizontal. Housed in a refractory-lined cylindrical steel furnace 4 ft in diam and 32 ft over-all, it is designed to process

core sand containing either core oil or urea resins at the rate of 10 tons per hour. Elevator E feeds material to it continuously.

The alloy tube has machined terminal ends, outside the furnace chamber, for carrying the driving sprocket and riding rings. Each ring rides on two trunnion rolls, and the cylinder is driven by a chain drive from a variable speed reduction unit, at cylinder speeds of from 2 to 8 rpm.

Spiral flights inside the alloy tube at the feed end move material forward rapidly. Short radial flights for the balance of the tube length agitate the material as it passes through the cylinder. The alloy tube is heated by a series of 12 oil burners on the lower side of the furnace and is fired through an opening in the firebrick lining. Feed of oil to the burners is governed by an air-oil proportioning valve, and combustion air is supplied by a turboblower. A recording temperature controller with thermocouples in the material stream at the discharge end of the calciner provides burner control of calcination temperatures.

Cooler—The discharge end of the calciner projects into a breeching which is hoppered at the bottom to discharge calcined sand into the cooler (G). Sand enters the calciner at 60° F and is heated to 1400° F if it is oil sand and to 1800° F if it is resin sand. At 5.9 rpm, the sand remains in the cylinder 10 minutes, and maximum fuel consumption is 140 gph. See Table I.

A view of sand from core knockout room and disposal dump as it appears in the receiving hopper

TABLE I—Calciner and Classifier Performance Data

CALCINER	
Material entering temperature	60° F
Oil sand, heat to	1400° F
Resin sand, heat to	1800° F
Tube wall temperature	1500° F to 1900° F
Fuel consumption, max	140 gph
Cylinder retention time	10 minutes at 5.9 rpm
CLASSIFIER	
Oil sand entering temperature	1400° F
Resin sand entering temperature	1800° F
Either sand leaving temperature	125° F or less
Water consumption	75 gpm
Cylinder retention time	11 minutes at 6 rpm

The cooler (G) consists of a rotating cylinder inclined slightly to the horizontal. It is 7 ft in diam by 37 ft 6 in. over-all and is rotated by a chain and sprocket drive. Eight tubes 18 in. in diam and 35 ft long are located around the inside diameter of the cylinder shell. A breeching on the loading end conveys sand from the calciner and discharges it into each of the eight tubes as the cylinder revolves. A scalping screen removes any foreign material from the sand. At the feed end of the barrel, a water spray cools the breeching as the hot, calcined sand passes over it.

Water is introduced into the discharge end of the cooler. It reaches a depth of 21 in., covering the bottom tube as the barrel rotates, and continuously exposes the hot sand inside to the cool surfaces of the tube, or cylinder, as it advances through the tube. A drain is provided to carry water from the barrel as it circulates through the cylinders.

As enumerated above, oil sand enters at 1400° F and resin sand at 1800° F. Both leave at 125° F or less after 11 minutes. The cylinder turns at 6 rpm, and water consumption is 75 gpm. See Table I.

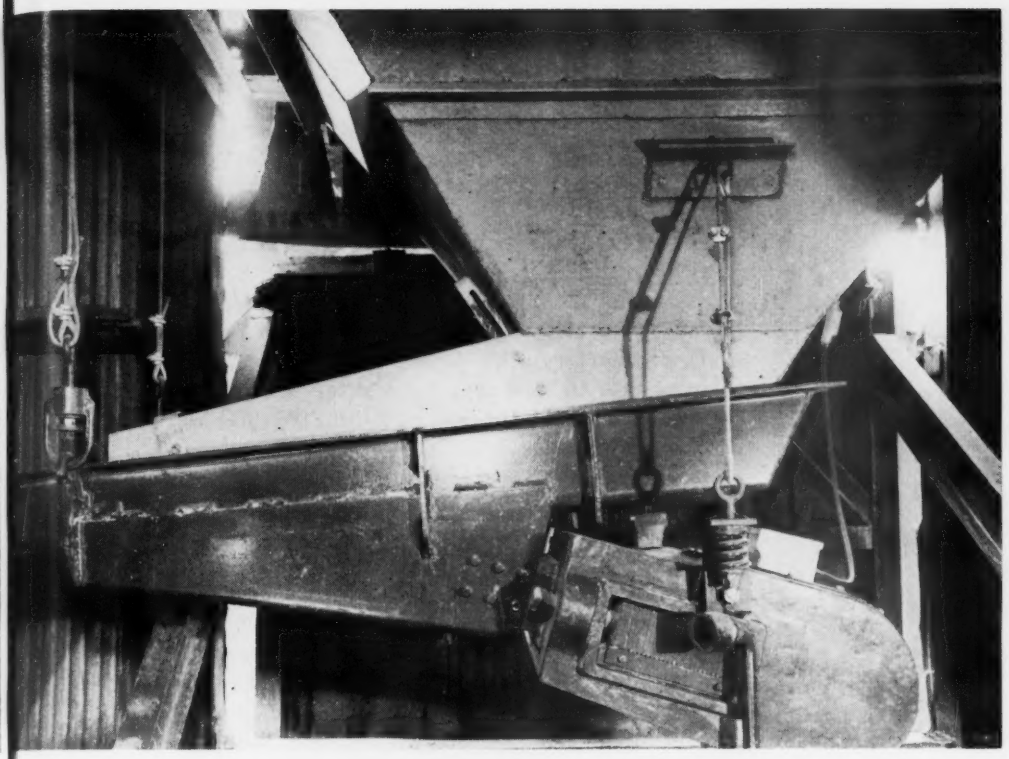
From the cooler, sand moves successively to a bucket elevator (H), a belt conveyor (I) and a classifier (J). The sand classifying system in turn consists of three units, J, K and L.

Classifier—Unit J is a steel cabinet 2 ft wide, 3 ft 6 in. high and 6 ft long. One 2-ft end is open and is divided into two 1-ft sections, each 3 ft 6 in. high. Eight steel plates are located 4 in. back from the open end of the cabinet. These plates are set at a required angle with a 3-in. opening between each. Sand cascades over these plates.

The mixture of 60 and 180-screen sand from the cooler is discharged into a hopper on top of the classifier and is fed from there down and over the plates. While the sand is flowing over them, a No. 35 mill exhauster with cone wheels draws a stream of air through the opening. The heavier or large grains of sand are deposited in a hopper at the bottom of the classifier. This separation segregates the sand with an AFS grain classification of 60. Lighter sand grains are carried by the air flow into the skimmer precleaner (K) for the second phase of sand classification.

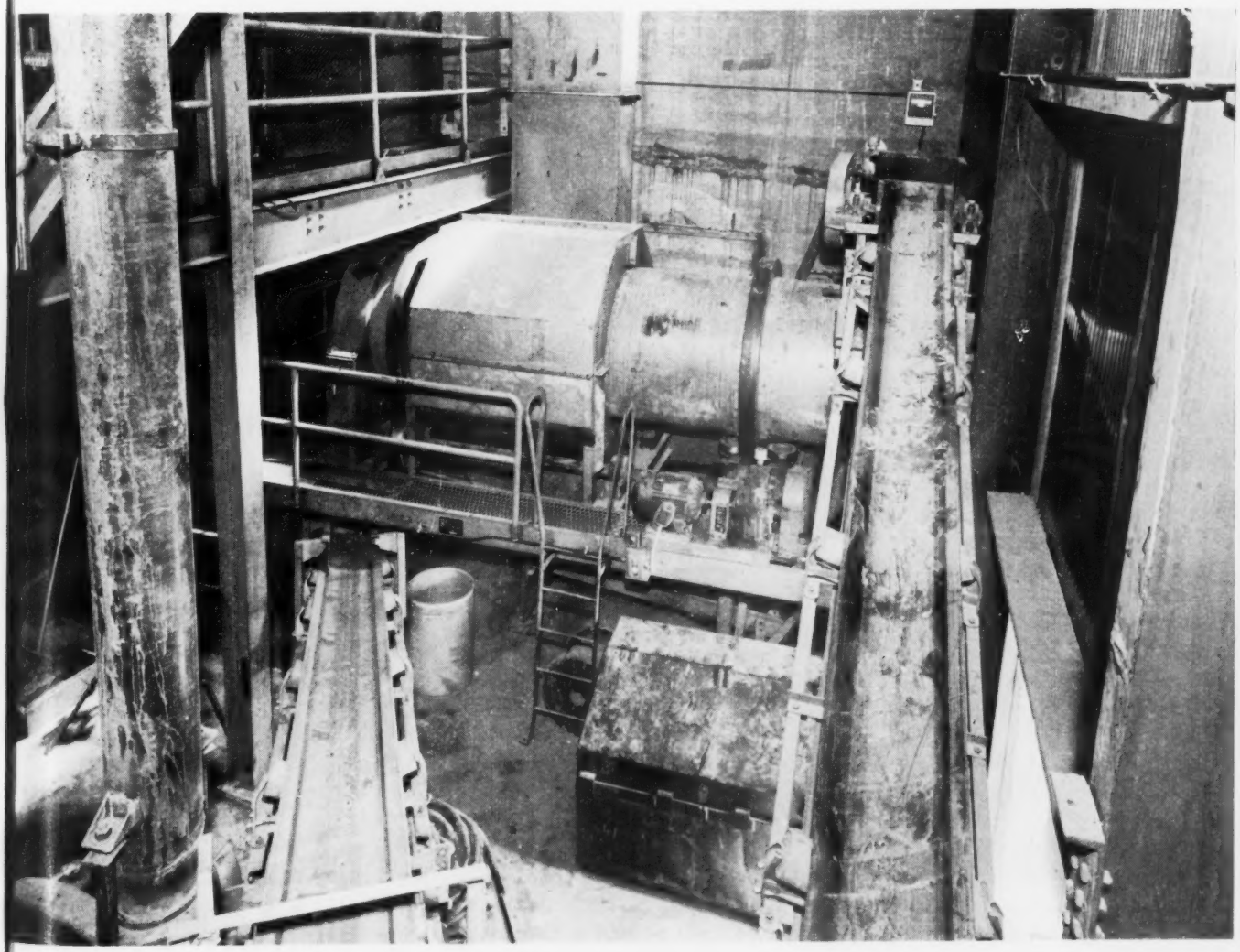
The skimmer precleaner is another steel cabinet, this one 3 ft x 3 ft x 7 ft high, through which the sand is processed. Larger or heavier sand grains in the mixture entering it are deposited in a hopper. Sand deposited there has a screen analysis of about 160-grain fineness.

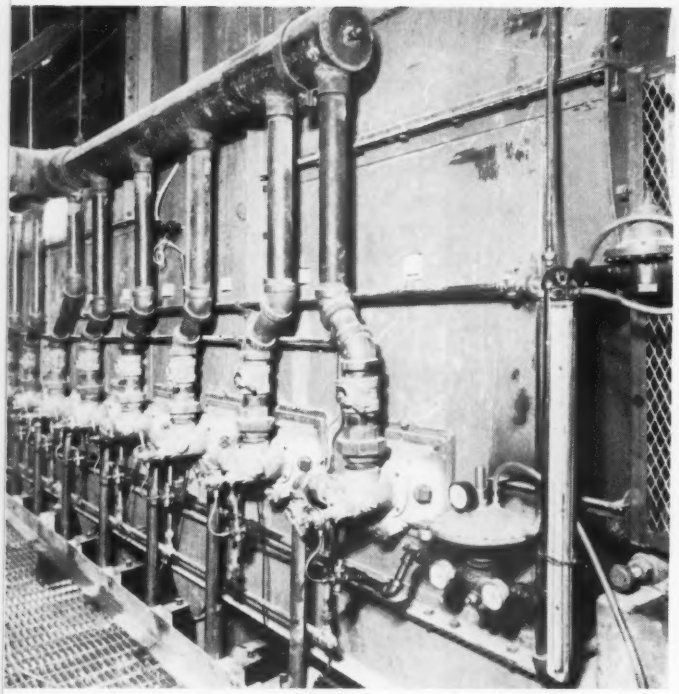
The lighter material remaining is carried into a dust cloth collector by a No. 40 mill exhauster



Side view of vibrating pan feeder under receiving hopper. It is a flat pan trough 2 ft wide and 5 ft long and feeds the mixture of sand, broken cores and metal to a conveyor at the left of the feeder

Belt conveyor (B) at right feeds material to breaker barrel, which reduces lumps of sand to grain size. Recirculating belt (D) at left front returns any unbroken lumps





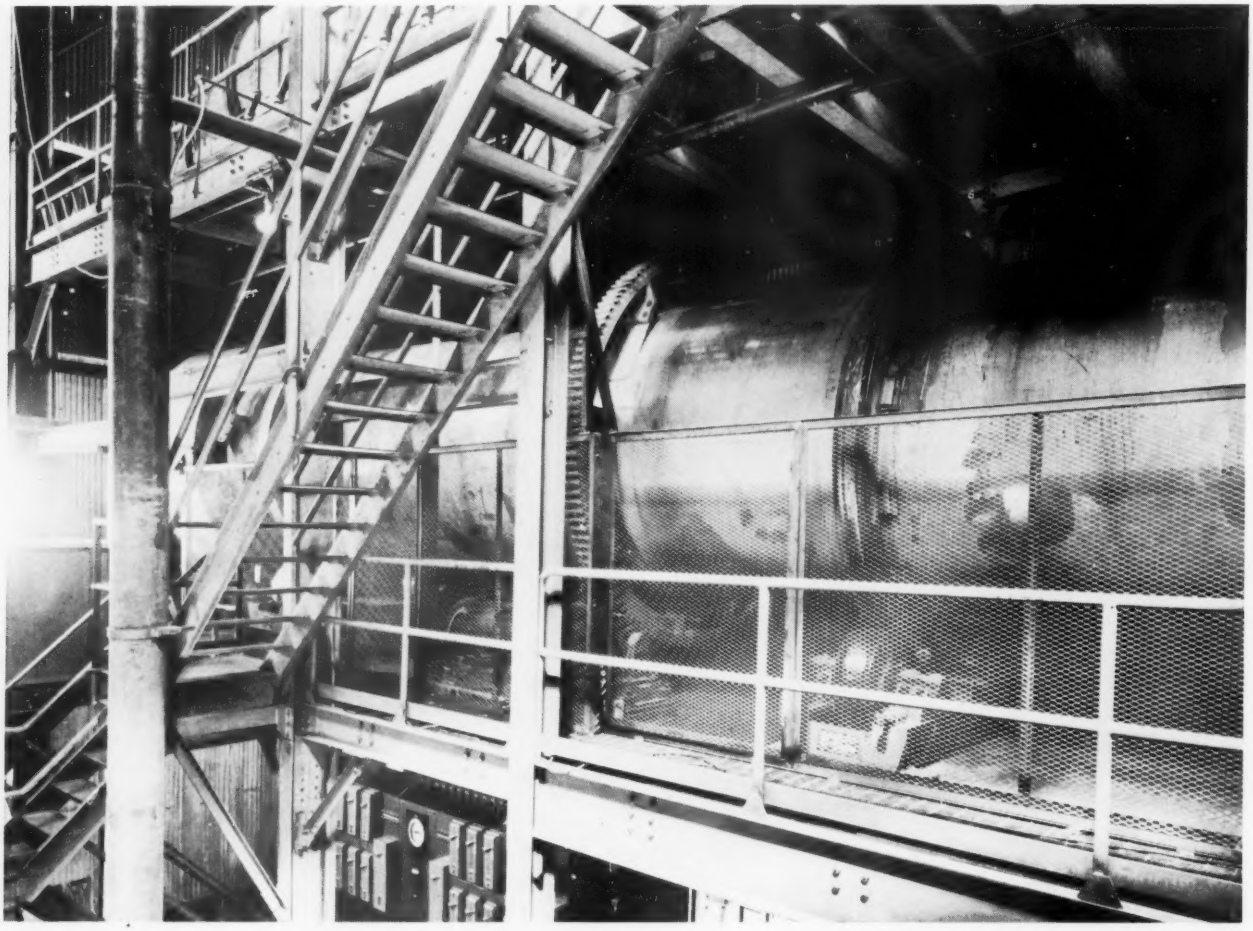
Calciner consists of a rotary alloy tube. Inclined slightly to horizontal, it is housed in a refractory-lined cylindrical steel furnace

with cone wheels. The collector is equipped with a motor-driven vibrator, and a double hopper at the bottom conveys sand into trickle valves which unload it continuously onto a 10-in. conveyor belt (M). This material has a screen analysis of around 270 and pan grain fineness. The belt (M) conveys this fine sand back under the outlet on the skimmer unit (K), where it is blended with the 160 sand to obtain the proper grain distribution to produce a 180 grade.

As the sand is classified, it is discharged into one of two 48-ton steel bins (N). These bins are located under units J and K. The 60-grain sand drops into the one under J and the 180 grain (that is, a mixture of the 160 and the 270) into the bin under K. Table II shows the typical screen analyses of new sand and reclaimed sand.

Provision has been made to reduce wear to a minimum at all points coming in contact with sand during the classifying operation—or at any other, for that matter. In order to hold the desired separation, it is necessary to maintain a constant velocity condition across the unit at all times.

Mixture Ingredients Controlled—Weigh hoppers (S) under each of the two steel bins weigh the sand in the required proportions and discharge the load into a mixer (T). Not only the sand, but also the binders, core oil, water, etc., are weighed or measured automatically before they enter the



Cooler is a rotating cylinder inclined slightly to horizontal. It is 7 ft in diameter by 37 ft 6 in. over-all and is rotated by a chain and sprocket drive

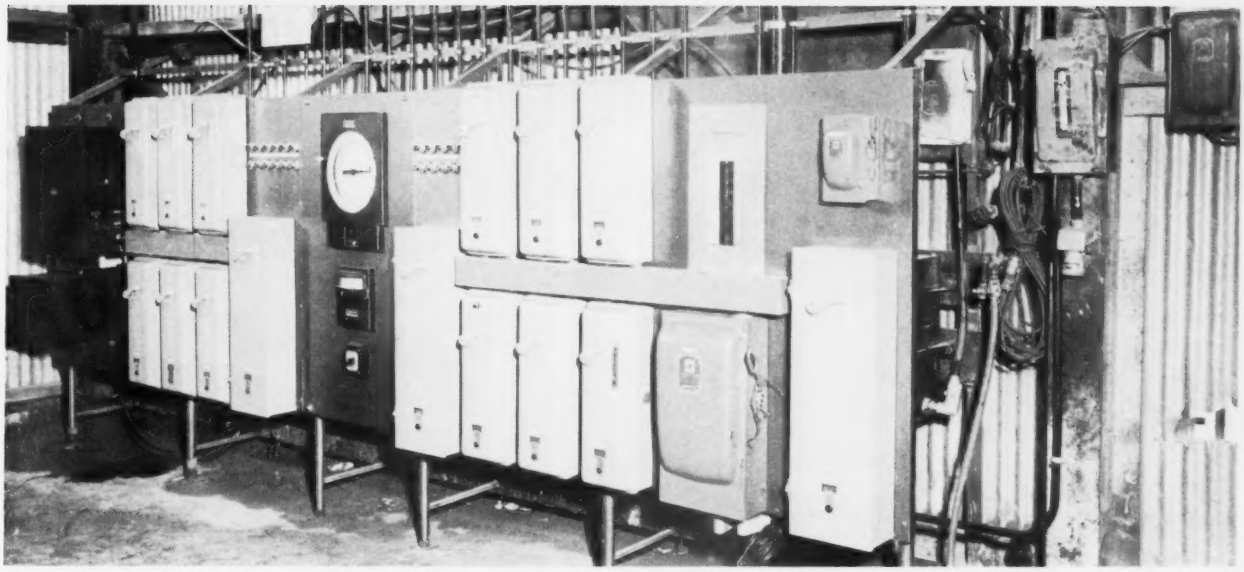


Illustration shows control panel for the entire core sand reclamation system

mixer. This procedure assures the correct formula for the core sand.

When the two steel bins are loaded to capacity, the overflow is diverted to two large concrete bins, on each side of the steel bins, by screw conveyor (O) and conveyor belt (P). The bin for the 180-screen sand holds up to 410 tons, and the bin for the 60-screen sand has a capacity of 380 tons.

The steel bins are refilled from the concrete bins as often as necessary by two screw conveyors (Q) located in the bottom of the large bins. These conveyors move sand to a bucket elevator (R) at the rear of the steel bins. This arrangement permits operation of the system at any time without interference with the routine mixing of a batch of core sand in the core department. Since it requires 20 hours to heat the alloy tube in the calciner (F) to temperature without distortion, it is economical to operate the system to capacity until the storage bins are filled.

Advantages of the system are related to the factors mentioned in the opening of this article: The only storage required is for sand being processed through the system; a picking belt, magnet and scalping screens recover metal; and the core sand mixture is under better control because all sand going into the mixing equipment is dry. In addition, the system can be operated at a reduced temperature to dry new sand, which can be placed in the regular bins. If a change in practice requires a new type of sand, it can be dried and be made to bypass the classifier to a special bin.

The reclamation system was installed by C. O. Bartlett & Snow Co., Cleveland, and the classifier was furnished by G. A. Stevens, Rochester, N. Y.

TABLE II—Typical Screen Analyses, New and Reclaimed Sands

Screen No.	New No. 180 McConnellsville Sand	Reclaimed
50	.50	.20
70	.60	2.10
100	3.50	4.00
140	8.65	5.50
200	12.90	13.20
270	10.20	12.40
Pan	13.60	12.60
Total	49.95	50.00
AFS	181.5	181.0
Screen No.	**New No. 60 Mexico Bay Sand**	**Reclaimed**
30	.05	....
40	.30	.70
50	4.65	5.75
70	21.30	20.50
100	19.90	18.30
140	3.25	3.50
200	.25	1.00
270	.15	.15
Pan	.10	.05
Total	49.95	49.95
AFS	60.1	61.9

Overhead view of the bin for 180-screen reclaimed sand. Smaller bin holds reclaimed 60-screen sand

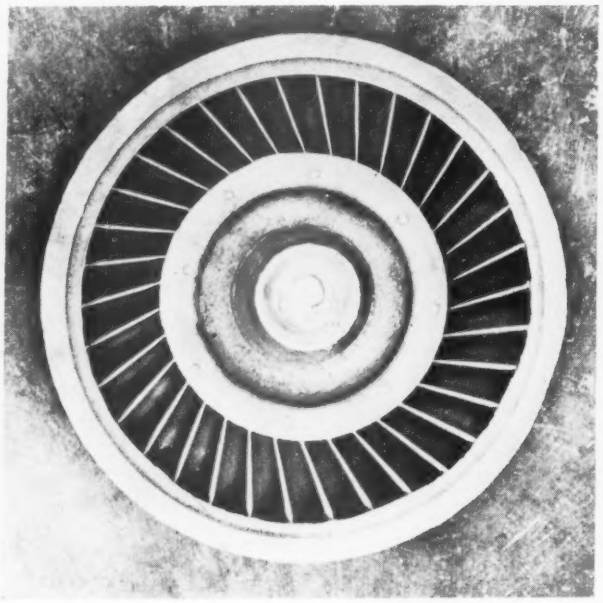


Fig. 1—Top view of turbine nozzle, first investment casting to be made at Battelle

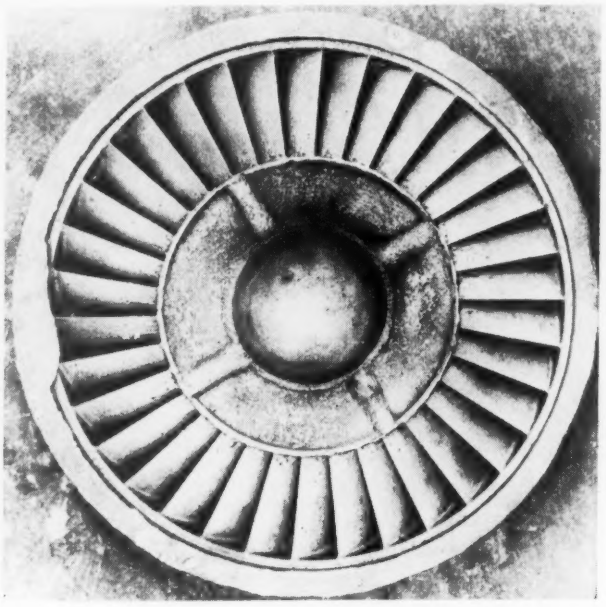


Fig. 2—Bottom view of the nozzle. Successful casting was made on 22nd attempt

A Study of Investment Materials

The author describes results of studies concerning the materials commonly used in investment casting procedures. This paper was presented at the fall meeting, Investment Casting Institute, Nov. 3-4, in Chicago

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MY INTEREST in investment casting began in the early years of World War II when one of the engine manufacturers asked Battelle for assistance in casting a nozzle for their first experimental gas turbine. At that time, industrial investment casting was in its infancy. Most investment castings were used to adorn the young and romantic or to restore the masticating ability of older people.

Before we were successful in making a turbine nozzle, we found it necessary to develop a special replica material and to compound a special investment. On our 22nd attempt, using an investment vane core and baked core sand for the balance of the mold, we obtained what we thought was a pretty good nozzle. Top and bottom views of this nozzle are shown in Figs. 1 and 2. The nozzle was about 20 inches in diameter and had 34 vanes. It was cast centrifugally and the secret to filling it, after obtaining a satisfactory mold, was to have the metal hot and to get it into the mold fast.

Since our work on this nozzle, we have had projects almost continuously which involved investment casting. The most recent of these problems was concerned with the investment casting of titanium.

The term "investment casting" is applied to a rather wide range of procedures for making relatively small intricate castings to close dimensional tolerances and generally having smooth surfaces. Investment molds are monolithic, i.e., they are made in one piece and therefore have no parting

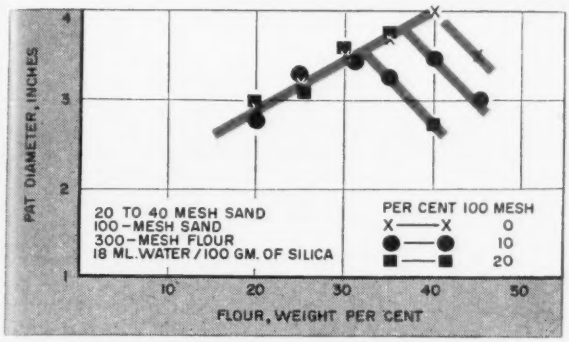


Fig. 3—Chart illustrates the effect of particle size distribution on fluidity

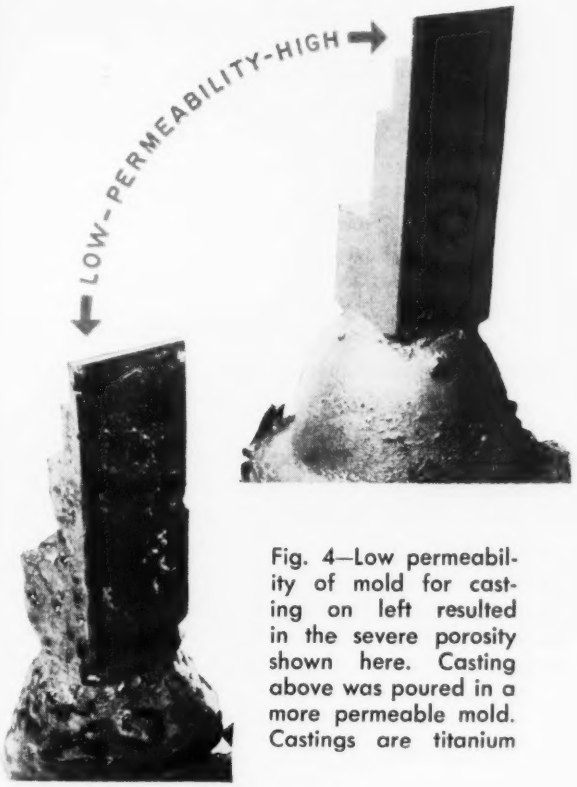


Fig. 4—Low permeability of mold for casting on left resulted in the severe porosity shown here. Casting above was poured in a more permeable mold. Castings are titanium

lines. As in other types of molds, the principal component is the refractory aggregate. The binders are different from those used in ordinary sand molding in that they permit the refractory to be made into a fluid mix which hardens after standing a period of time. The molds are then heated to 1200 to 1850°F to remove the expendable patterns and any volatile components of the mold.

Where the single investment technique is employed, it is necessary that the refractory particles be very fine in order to obtain smooth castings. Commercial investments having the largest particle sizes as fine as 200 or 250 mesh have become accepted. These fine investments are usually mixed with sufficient liquid to give a very thin consistency which permits easy removal of entrapped air entrained during mixing operations.

Where the two-step process is used, a very fine material is first applied to the replica by dipping or spraying. After this first coat dries, it is usually backed up with a coarser grade of material. Sometimes the coarsest particles of the back-up investment are as large as 20 or 80 mesh.

Good packing of the refractory particles is important for a number of reasons. Extremely poor packing may leave voids behind the precoating, causing it to spall during heating. Also, the metal being cast may break through the unsupported precoating. Poor packing of a less gross nature results in lower mold strength, possibly unequal expansion, and greater tendency for the molds to crack during heating.

Good packing is most easily obtained when the investment contains two ranges of particle sizes: One a closely graded coarse fraction of well-rounded grains, the other a fine (flour) grade. The coarse portion may be as coarse as 20 mesh, but the flour should be at least as fine as 200 mesh, with particles ranging down to the micron size. Well-rounded grains in the coarse fraction slide over each other more readily and pack more closely than angular or sharp grains. The best strength for a given percentage of binder, and the best fluidity of the investment, result with the combination of the two grades which gives the greatest density.

If we consider a single uniformly graded material, the closest possible packing or hexagonal arrangement leaves 25.9 per cent of void space. The most open, or cubic arrangement, has 47.6 per cent of voids. In practice, a mixture of these and other arrangements will be obtained with the void space being about 35 per cent. For greatest density then, just sufficient fines to fill these void spaces will be required. If the proportion of fines exceeds this amount, the tendency for the molds to crack during firing is greatly increased.

The fluidity or mobility for binary mixtures of 20- to 40-mesh silica sand and 300-mesh silica flour and for ternary mixtures containing 100-mesh sand is shown in Fig. 3. The amount of gaging water was kept constant at 18 ml/100 grams of the silica mixture. The data were obtained by the slump method wherein a cylinder 1 in. in diameter and 2 in. high was placed on a glass plate and then filled with the mixture. The cylinder was then raised and the diameter of the resulting pat was measured.

For the binary mixtures, fluidity increased with increasing proportions of flour until a peak was reached at 40 weight per cent of flour. Fluidity then decreased at a rapid rate as excess flour was added. Including 100-mesh silica sand in the mixture reduced the maximum fluidity attainable, with the maximum being reached with smaller additions of flour.

A smoother more easily handled investment results if the coarsest particles are reduced to 60 or even 80 mesh. The finer investments are particularly desirable if the investment is one that sets

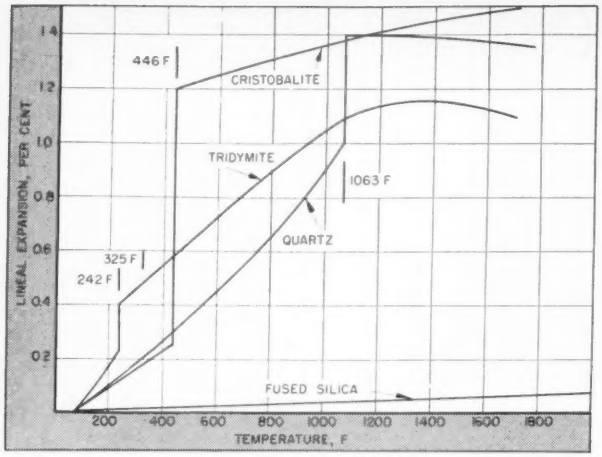


Fig. 5—Thermal expansion of four forms of silica

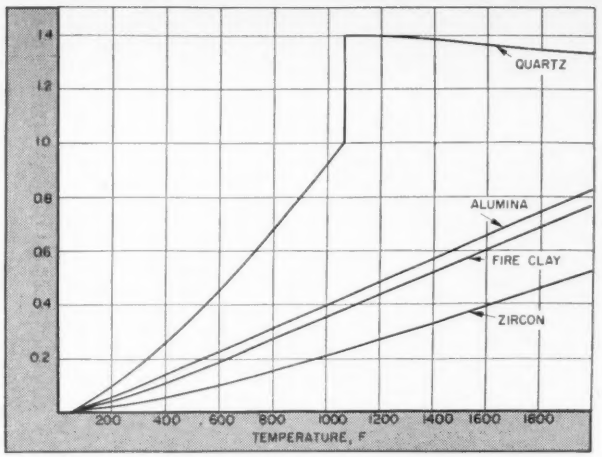


Fig. 6—Thermal expansion of various refractories

within a few minutes after pouring and is not compacted by vibration or jolting. Plaster-bonded investments and those bonded by the reaction product of magnesium oxide and ammonium dihydrogen phosphate are examples of this type. Where a slow-setting investment is employed and jolting is used for compaction, the coarser grades of refractories are preferred for the back-up investment. Some of the largest producers of investment castings use approximately equal proportions of 20-mesh grog, 80-mesh silica sand, and 200-mesh silica flour. Such investments are usually bonded with hydrolyzed ethyl silicate or a stable water sol of silicic acid.

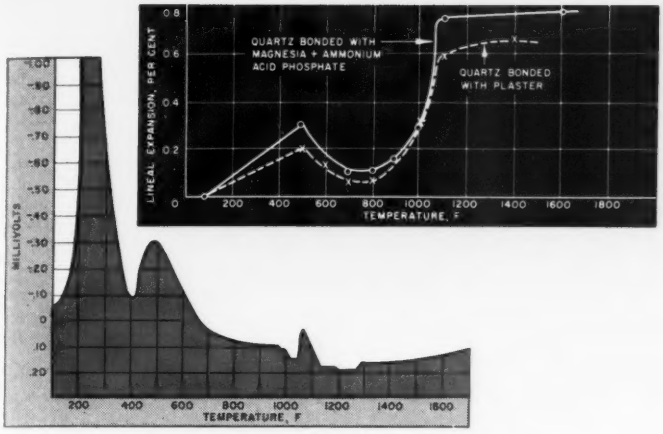
One advantage of the coarser investments is the greater permeability which can be obtained by keeping the percentage of fines low. This greater permeability permits the mold gases to escape rapidly during firing, so that relatively high rates of heating can be used. Also, in gravity or suction casting, in particular, permeability of the mold may be very important. Fig. 4 shows titanium test castings gravity poured into zirconium oxide molds bonded with hydrolyzed ethyl silicate. The casting on the left resulted from a mold of low permeability made from 325-mesh zirconium oxide. The gases could not escape and resulted in a very porous casting. The other casting was poured into a mold having a 325-mesh precoating backed up with 30-mesh investment containing very little fine material. The greater permeability of this latter mold permitted the gases to escape and the casting was sound.

The amount of expansion during heating and the manner in which it occurs is important from the standpoint of casting dimensions and cracking of the molds. For economic reasons, quartz is the most commonly used refractory for investments. Quartz expands about 1.4 per cent on heating to about 1100° F, and much of this expansion occurs suddenly at 1063° F. This sudden expansion results from the allotropic change from alpha to beta quartz. This is a reversible transformation and on cooling a corresponding shrinkage occurs at the same temperature. Rapid heating or cooling of molds in this temperature range may cause them to crack. The other allotropic forms of silica, tridymite and cristobalite also undergo inversions on heating or cooling with accompanying changes in dimensions. The expansion-contraction curves for the four forms of silica are shown in Fig. 5.

Quartz expands fairly uniformly with increasing temperature, reaching about 1 per cent expansion at 1063° F. It then expands about 0.4 per cent isothermally as additional heat is supplied. Above 1063° F, quartz changes dimensions very little as the temperature is increased further, and actually shrinks a little rather than expands. Cristobalite undergoes an inversion at 446° F, and expands about 1.0 per cent isothermally. Above this temperature, it expands uniformly at a low rate as the temperature is increased further. Tridymite actually has two inversions, but the second one at 325° F results in a very small volume change. The inversion at 242° F is accompanied by an expansion or contraction of about 0.2 per cent, which is less than for the inversions in cristobalite and quartz. The maximum expansion for tridymite is reached at about 1200° F and is slightly less than for quartz or cristobalite at this temperature. Therefore, molds made from tridymite would be expected to have less tendency to crack during heating or cooling than molds made from quartz or cristobalite. Fused silica has very low thermal expansion, but it is costly and is not available for use in investment molds.

The expansion curves for other refractories sometimes used in investment molds are shown in Fig. 6. The curve for quartz was included on this figure for easy comparison. Expansion for alumina, fireclay, and zircon is quite low and uniform; this is particularly true for zircon. Molds made from these materials should, therefore, be less prone to crack during firing than molds made from silica.

The problems of expansion and contraction do not end with the refractory filler. Most of the binders undergo changes on heating that are accompanied by shrinkage. Plaster of Paris and the magnesia-ammonium dihydrogen phosphate



Figs. 7-8—*Top,* thermal expansion of investments. *Bottom,* thermal analysis, phosphate-bonded silica

bond is one that is used primarily for casting ferrous and other high-melting alloys.

Thermal-expansion curves for investments made with these two bonds are shown in Fig. 7. The refractory filler in both instances was quartz. The shapes of the two curves are quite similar and show clearly that both binders undergo appreciable shrinkage at temperatures between 500 and 700° F. During heating, the outer portions of a mold are hotter than the interior. Therefore, when the surface of a mold made from such an investment passes through the temperature range 500 to 700° F, it tends to shrink and there is considerable danger that it will crack. Incorporation of cristobalite into such an investment should give it a more favorable thermal-expansion curve since cristobalite expands sharply at 446° F and would offset the shrinkage of the binder. Also, use of as little binder as possible and obtaining a high degree of compaction of the refractory filler are beneficial in reducing the shrinkage.

Sometimes there are physical changes within investments which cannot be detected from thermal-expansion data. These changes may require a great deal of heat to drive them to completion. Thermal analysis provides a convenient method for establishing the temperatures where these changes occur and indicates the amount of heat involved. Fig. 8 shows thermal data in graphical form for silica bonded with magnesia and ammonium dihydrogen phosphate.

In making this test, equal weights of the investment and fused alumina were placed in separate nickel crucibles. Fused alumina was used as a comparison material because it undergoes no transformations in the temperature range of interest. Two thermocouples are required—one a differential couple with a hot junction in both the investment and the alumina; the other, a couple to indicate the temperature of the investment. The two materials were then placed close together in a muffle furnace and heated at about 5 degrees per minute. In the figure, the potential difference is plotted against temperature of the investment. The potential difference results from the difference in temperature between the two materials and becomes greater as the difference increases.

Thermal effects are indicated at three temperatures: 210 to 220° F where the free water and water of crystallization is eliminated, 490° F where the magnesium ammonium phosphate changes to magnesium pyrophosphate, and 1063° F where the alpha quartz inverts to beta quartz. All of these reactions are endothermic, ie., heat must be supplied to make them proceed. That the reactions are endothermic is apparent because the temperature of the investment lags behind the temperature of the alumina while the reactions are proceeding. In heating investment molds, it is important to consider these reactions, allowing more time at the temperatures where large quantities of heat are absorbed. Otherwise high temperature gradients within the molds may cause cracking.

For an investment binder to be satisfactory, it must be soluble in the carrier liquid and remain soluble until the investment has been poured or vibrated into the flask. It must then undergo a chemical reaction or physical change so that it becomes essentially insoluble. Also, after becoming insoluble, it should be capable of taking up the excess liquid so that the mass becomes solid and dry to touch. If the reaction product has excessive solubility or too much unreacted binder remains, it may tend to migrate to the surface of the mold as the carrier liquid evaporates.

May Cause Rough Surface

This migration of soluble salts to the mold cavity can result in rough castings. This latter condition might occur if the replicas are melted out at 180 to 200° F, for example, and the molds are then held at this temperature for an excessive period of time. The carrier liquid evaporates from all exposed surfaces, including the mold cavity, leaving behind a deposit of the previously dissolved salts. If the investment has a tendency for the binder to migrate, it would be better to increase the furnace temperature somewhat above the boiling temperature of the carrier liquid so that it vaporizes below the mold surface rather than immediately on the surface.

There is no question that some parts can be made best by investment casting. With other parts, a choice of methods is available; where this is true, the method that gives the desired product at the lowest cost is the one selected. Therefore, in order to continue to grow, the investment casting industry must constantly be looking for ways to reduce costs and obtain better know-how so that an ever-widening range of castings can be made economically. It is reasonable to think that all of the procedures now used in making investment castings cannot be equal in performance and costs. Instead, some procedures must have advantages over others in making specific classifications of castings. Therefore, a better understanding of the advantages and disadvantages of the various procedures should permit the investment caster to select the procedure best suited for the casting involved.

Modern Facilities Incorporated

New Ingot Mold Foundry

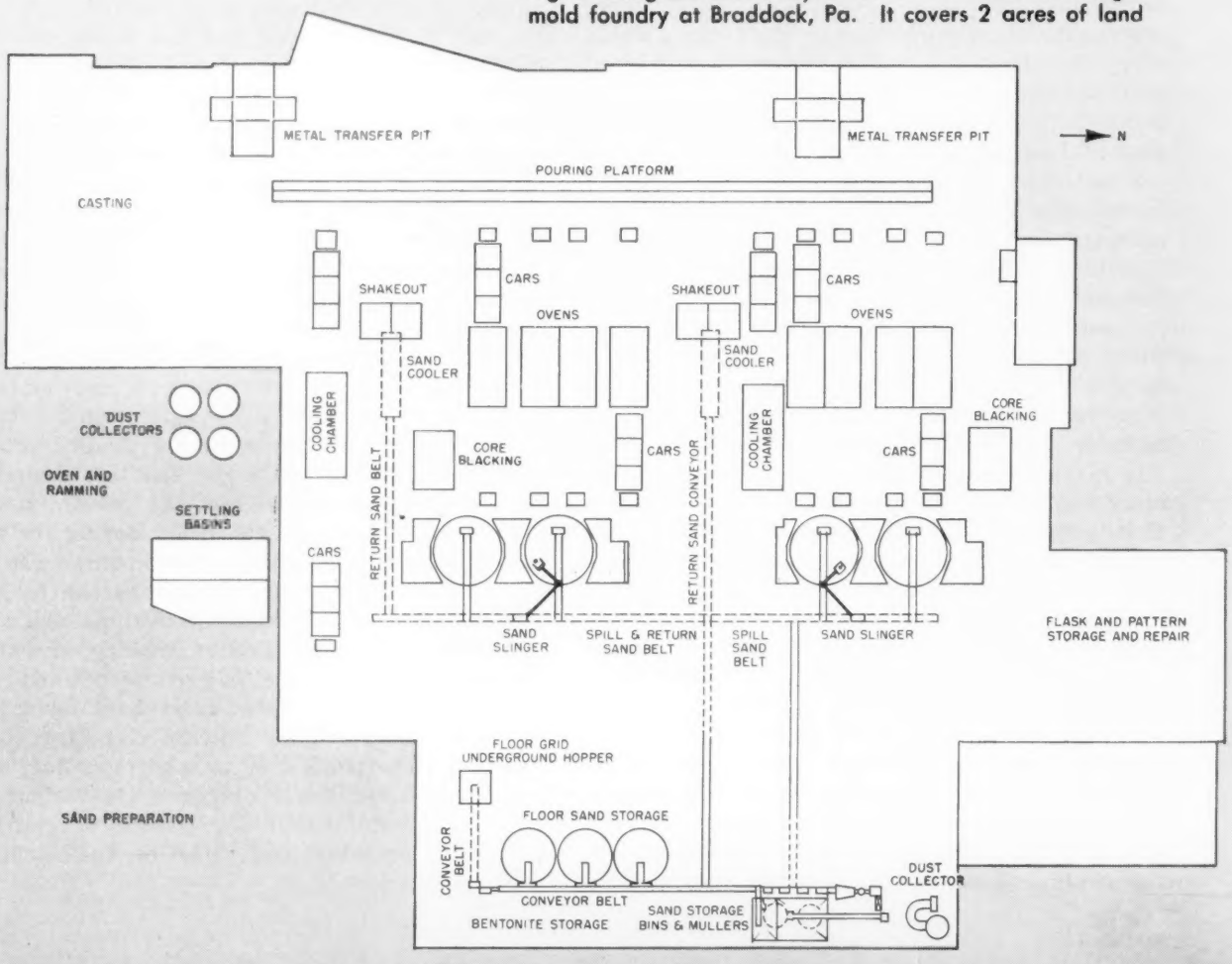
RECENTLY completed, the ingot mold foundry of United States Steel Corp. at its Edgar Thomson Works, Braddock, Pa., is perhaps the most modern in the industry. Occupying a floor area of 2 acres, or about 88,000 sq ft, the foundry is capable of producing 275,000 tons of ingot molds annually for the corporation's steel mills in the Pittsburgh-Youngstown district and for the Fairless Works.

To provide pleasant, healthful working conditions, the foundry is equipped with heating and ventilating systems, especially at points where dust conditions may exist. Mechanization is employed wherever possible to minimize labor fatigue.

As indicated by the sketch of the floor plan in Fig. 1, the foundry is housed in three interconnected buildings. Longest dimension of the foundry extends north and south; this reference should be kept in mind in later descriptions. The three buildings house the sand preparation department, the ramming or molding and drying ovens departments and the casting department. Sand preparation department is located in the east building, the casting department in the west building and the ramming and oven departments between them.

The structure housing the sand preparation department is about 70 x 191 ft, with most of the equipment located along one side. Sand used in molding is a washed and dried silica-type from Portage County, Ohio, with 45 to 55 AFS grain fineness. It is mixed with 3 per cent western bentonite, ½ per cent pitch and 5 to 6 per cent water. Prepared sand shows a permeability of 150 and a green strength of 5 to 7 psi.

Fig. 1—Diagram shows layout of U. S. Steel's new ingot mold foundry at Braddock, Pa. It covers 2 acres of land



By EDWIN BREMER
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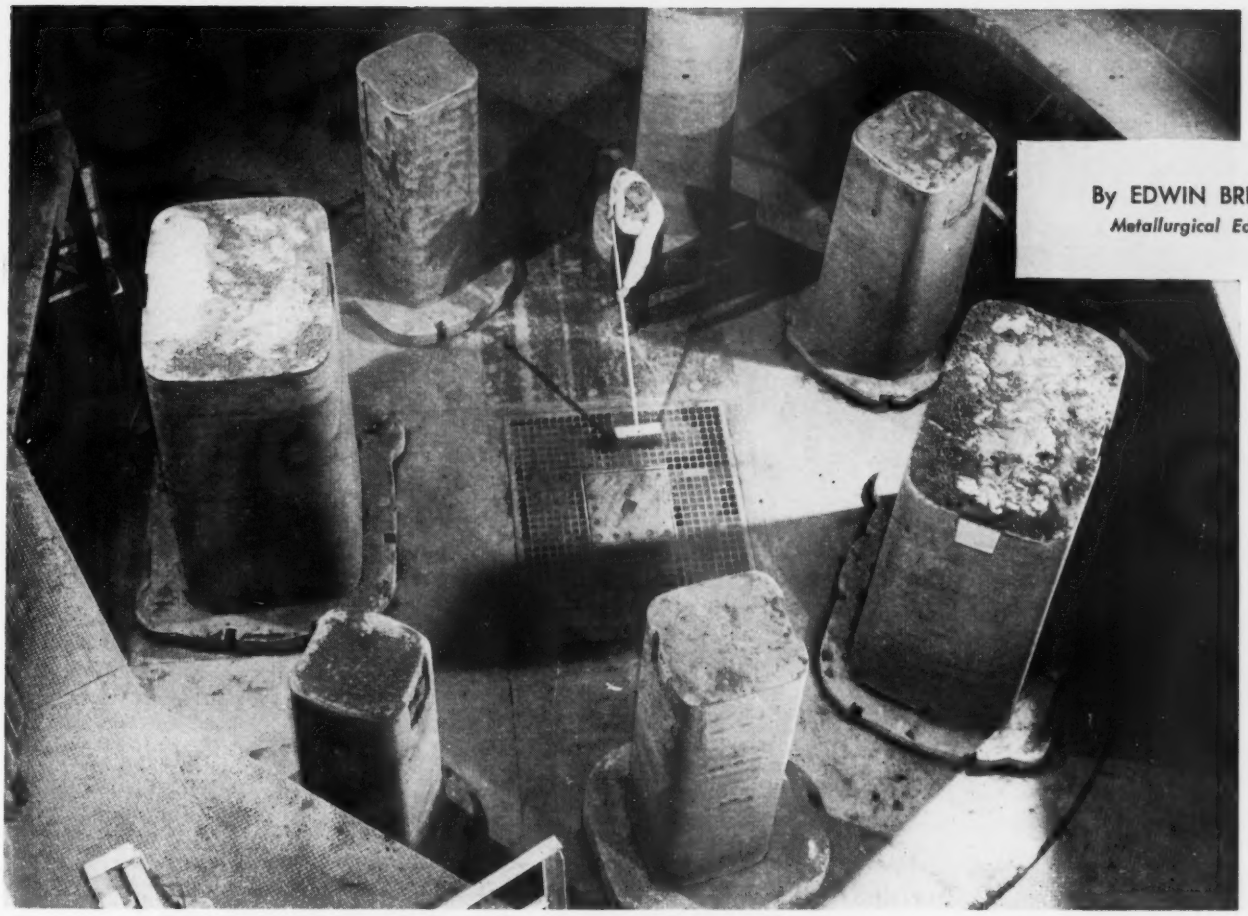


Fig. 2—Iron patterns form the ingot mold exteriors in sand-lined flasks. They are mounted on four turntables 25 ft in diameter, one of which is shown here

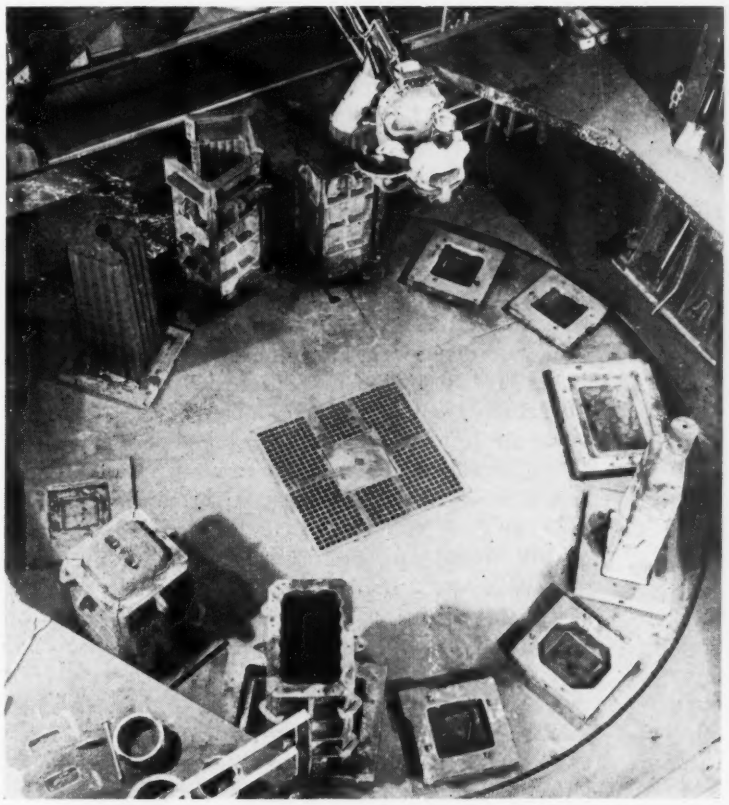


Fig. 3—Five stages of ingot mold core production are shown on turntable in view at left. Perched on sandslinger, molder rams the cores in rotation

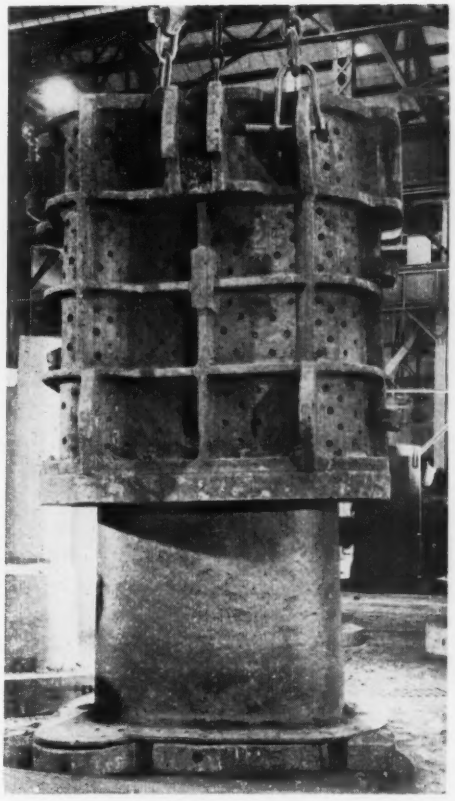


Fig. 4—At right, ingot mold flask is lowered into position in one of the last steps before automatic sandslinger is used to ram molding sand in place

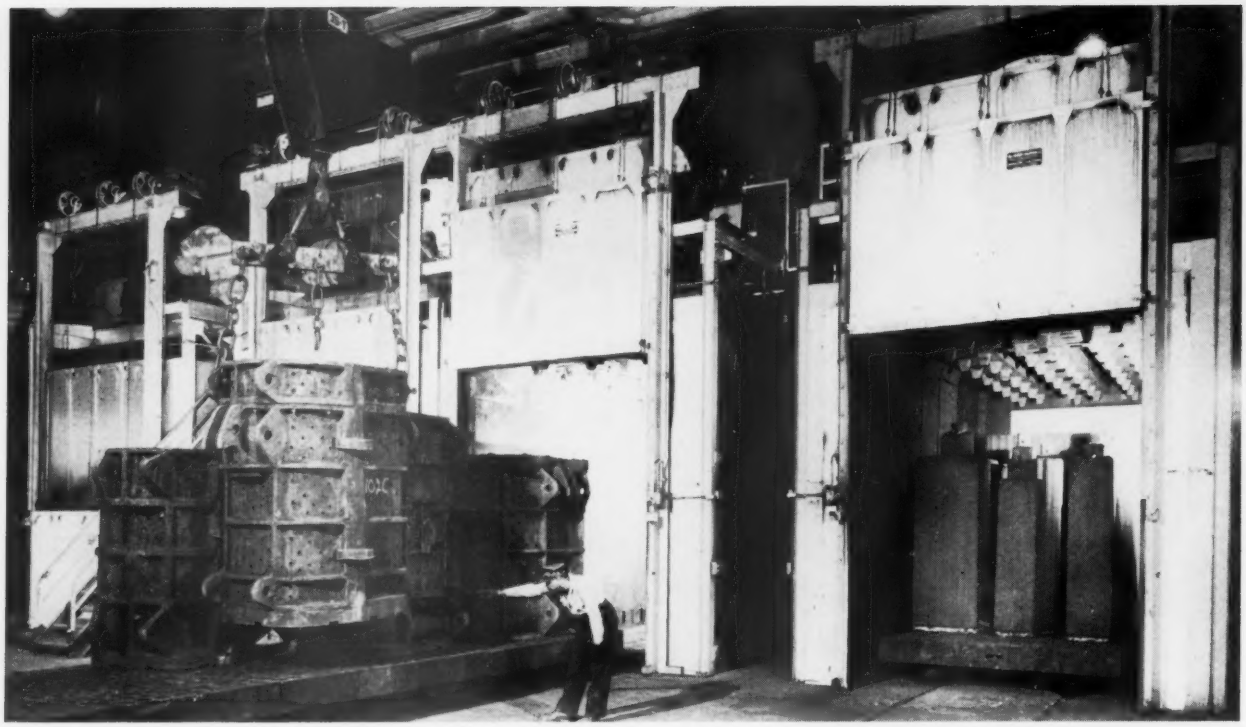


Fig. 5—Two banks of four recirculating, down-draft ovens dry sand molds and cores at temperatures as high as 750°F preparatory to casting of ingot molds

The washed and dried silica sand is brought into the building, unloaded into a hopper below the floor level at one end of the building and carried across on an underground belt 47 ft long. Sand is discharged into the boot of a bucket elevator which elevates it about 56 ft, to where it is emptied onto a 97-ft-long conveyor belt which carries the sand parallel to the wall of the building. A magnetic pulley at the end of the belt removes any tramp iron before it is discharged into chutes which distribute the new sand into either of two elevated, 50-ton storage bins.

New sand also can be stored on the floor adjacent to these bins by diverting the sand to three chutes located about midway between the elevator and the storage bins. Available area permits the storage of about 250 tons as a reserve supply.

Bentonite bond is received in bags and stored along the wall of the building. Bags are taken from there, emptied into a pneumatic system handling five bags at a time and distributed into five 10-ton capacity hoppers.

Used sand from the shakeout, which will be discussed later, is transported on a conveyor belt into the sand preparation department, where it is discharged onto an inclined conveyor belt parallel to the wall of the building. This belt, about 55 ft long, elevates the sand 13½ ft. It passes over a magnetic pulley and is discharged into a rotary hexagonal screen about 6 ft long. Oversized material passes through a crusher and falls onto a covered oscillating conveyor about 23 ft long which also carries the screened material.

The oscillating conveyor discharges into a bucket elevator, which raises the sand about 42½ ft and empties it onto a conveyor belt moving in the opposite direction to that of the oscillating conveyor. This belt carries the sand about 39 ft into an elevated storage bin of 200-ton capacity.

Bins or hoppers containing the new sand, bentonite and return sands are located adjacent to and above two 2200-lb capacity sand mullers. Sands, bentonite and water are fed automatically into the mullers from a control panel on the floor level. The panel also controls the mixing cycle, and when that is completed, the sand is discharged automatically onto a 70-ft conveyor belt which empties the sand into a 20-ton sandslinger hopper near the east side of the adjoining building, which houses the ramming and oven departments.

At all points in the sand preparation building where there is any possibility of the generation of dust because sand falls a slight distance, such as at the discharge from one belt to another, etc., hoods are provided. These are connected to a powerful exhaust system which carries the dust-laden air to a dust collector in one corner.

The building housing the ramming molding department and the drying ovens is about 127 x 286 ft. The molding section is located approximately along the center line of the building, with the ovens along the side of and extending into the casting department. Molds and cores are made on turntables with motive type sandslingers. The molding department is comprised essentially of two complete units arranged parallel to each other. Each of the units is comprised of a sandslinger, two turntables, four drying ovens, a shakeout unit and a flask and core barrel cooling chamber.

Since the molding units are the same, a description of one should suffice. The turntables, 25 ft in diameter and 7 ft apart, are of massive con-

Fig. 6—Ingot mold interiors are formed by corrugated sand cores at one of three pouring stations

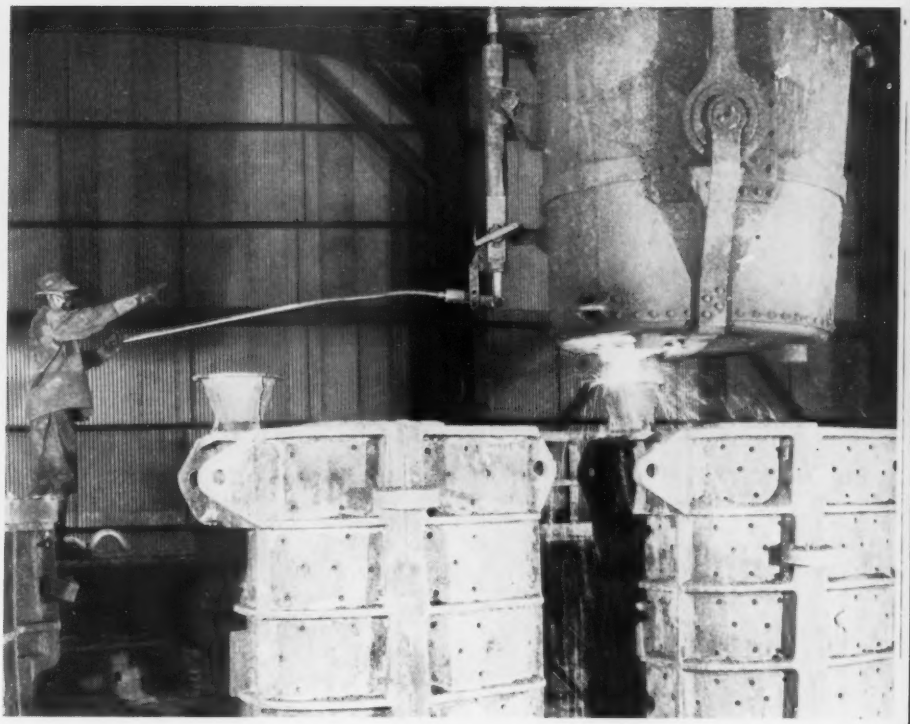


Fig. 7—Twenty-ton ladle casts 3½ to 5-ton ingot molds in molding rigs beside an elevated platform

struction since, as shown in Figs. 2 and 3, they carry exceedingly heavy loads. Essentially the turntables are gears with 24-in. faces covered with steel plates. They are rotated by electrically driven pinions. The turntables are partially surrounded by two elevated platforms from which operators perform such operations as setting spouts, finishing tops of molds and cores, hooking and unhooking crane chains from flasks, etc.

Flasks for molds, core boxes, patterns for molds and the core barrels are made of cast steel. Core boxes usually are made in four sections with machined, mitered corners and are held together with wedge clamps. Flasks for molds are made in sections split along the longest dimension and also are held together by wedge clamps. Usually cores are made on one table and molds on the other, but since the same sand is used for both cores and molds, both could be made on one table.

Spill sand from the ramming operation is swept into a 6-ft-sq open grid in the center of the turntable, as indicated in Fig. 2, where it falls into a hopper. From the hopper the sand drops onto a 26-ft belt, which discharges it onto a transverse belt 84 ft long moving underground across the front of the turntables. The latter belt discharges the sand onto the earlier mentioned conveyor belt bringing the sand from the shakeout.

Completed sand molds and cores are picked up by any of the three 35-ton cranes serving the department and are placed on cars which carry them into the drying ovens. Boxes are removed from the cores, which are picked up and placed in an adjacent area, where they are sprayed with blacking. Following that operation, the cores are picked up and placed on the cars.

Cars, which have cast steel grid tops, are about 9 ft square and arranged in three-car trains. They are equipped with single flange wheels which ride on steel rails with a 5-ft span. Drying ovens are gas-fired, recirculating types and are 13 ft wide, 27½ ft long and 18 ft high. Ovens are equipped with doors at both ends, and the cars are moved into and out of the ovens with car pullers.

Molds and cores are dried from 4 to 6 hours, depending upon size. Usually they are placed in the oven at a temperature of 200° F and during

Fig. 8—Electrically tilted 75-ton blast furnace ladle pours molten iron into 20-ton casting ladle

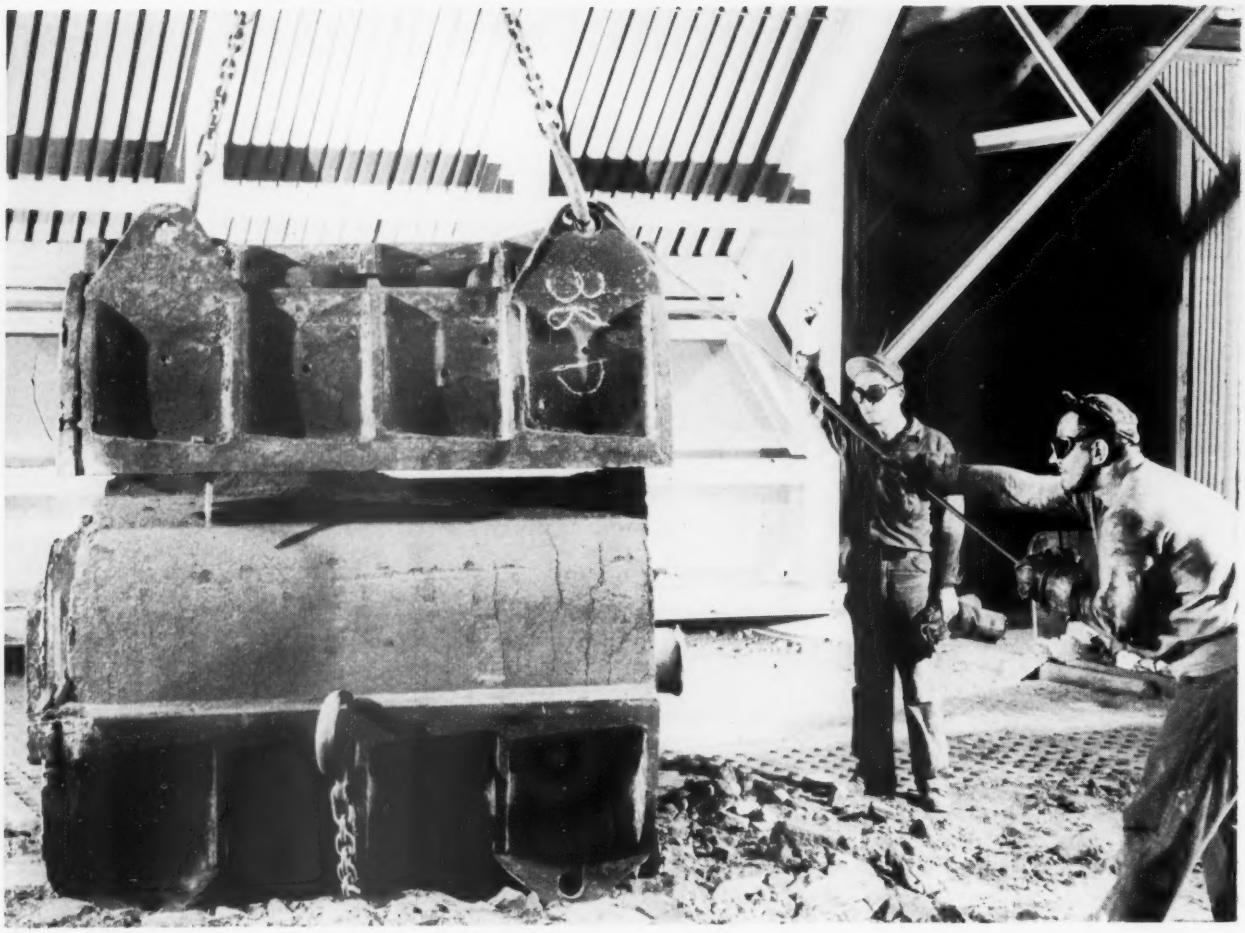


Fig. 9—Sand from the flask clings to solidified ingot mold as sections of the flask are removed

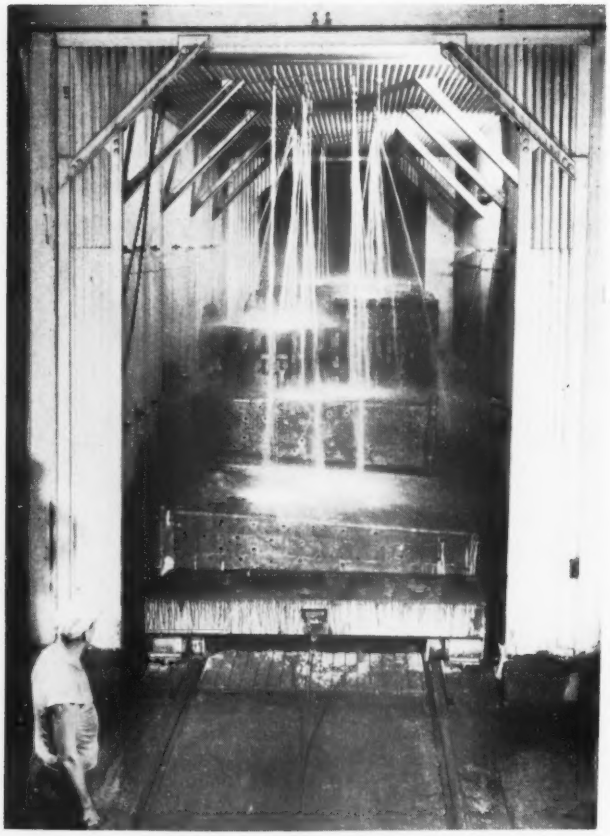


Fig. 10—Steel core barrels and flask rigs are water cooled after ingot molds have been cast

the drying period the temperature gradually is raised to 600°. Cycle and temperature of the oven are controlled automatically from recording type instruments mounted on a panel beside the oven. After the cores and molds have been dried, the cars are pulled from the ovens into the casting department and unloaded.

The casting department is about 100 x 360 ft. As shown in Figs. 1, 6 and 7, an elevated platform 236 ft long, 7 ft wide, and 6 ft above the floor level extends down the building about 40 ft from the wall. This pouring platform is covered with paving brick as a protection against spatters of molten metal and to provide pouring men a firm footing. The molds are lined up along both sides. The department is served by three 75-ton capacity cranes with 25-ton auxiliary hoists.

First operation in preparing the molds for pouring is placing the core on one of the large casting stool bases along the platform, as depicted in Fig. 6. The bases are set on short sections of steel rail located so that they are permanently level. These bases contain depressions into which the bases of the core barrels fit, bringing the lower edge of the sand of the core level with the base. The joint is filled with molding sand which is slicked down carefully to prevent entry of molten metal into the joint. Then the molds are lowered over the cores.

Fig. 11—Spray towers in rear remove dust from air. It collects as sludge in settling basin

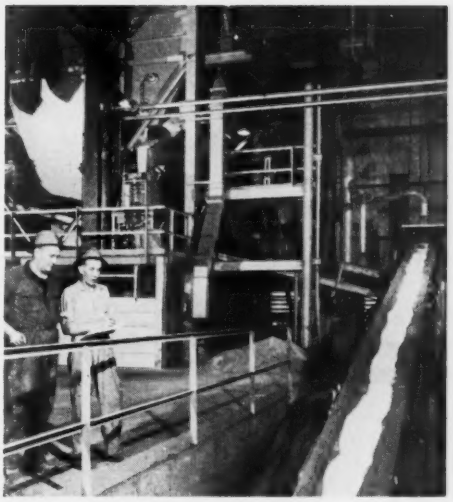


Fig. 12—Inclined conveyor belt transports sand from the shakeout grids to 200-ton storage bin

When the molds have been placed in position, funnel-shaped cast steel pouring cups lined with refractory brick are set over the sprue openings, and the molds are filled with molten cast iron from 20-ton capacity bottom-pour ladles (Fig. 7). Cast iron used for ingot molds is brought from a blast furnace nearby in special 75-ton capacity, oval-shaped ladles, as shown in Fig. 8, and is poured into the 20-ton ladles with an electrically operated tilting mechanism.

After the metal has solidified, the molds are picked up by one of the cranes and placed on the shakeout grid shown in Fig. 9. The mold first is placed in a vertical position. Then one hook of the chain sling is removed and attached to an ear near the bottom on the same side as the hook left in place. When the lifting action of the crane is applied, the mold tips to the horizontal position and is lowered onto the shakeout grid as shown in Fig. 9. Clamps are knocked off and one half of the flask is lifted off and placed on a car. Then by means of the hook and chain shown near the bottom of Fig. 9, the remaining section of the flask is rolled over, dumping its contents onto the grid. That flask then is placed on the car.

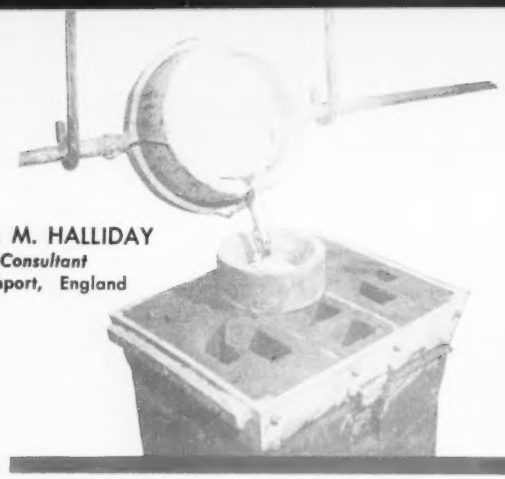
Rolling the flask over removes most of the sand from the exterior of the casting or ingot mold, and loosens the core so that the supporting arbor or barrel can be pulled out easily. The core barrel, as in the case of the flasks, is placed on a car. Cars containing a load of flasks and core barrels are moved into a cooling chamber 14 ft wide, 35½ ft long and 22 ft high. Top of the chamber, as may be seen in Fig. 10, is equipped with a large number of water jets which spray the flasks and core barrels and rapidly reduce their temperatures to a point where they can be handled easily. The cooling operation also permits more rapid turn-around of mold flasks and core barrels.

Shakeout grid is in two sections, each about 11 ft wide and 12 ft deep. At the back of the grid an outward sloping exhaust hood removes air from above and below the grid at the rate of 66,000 cfm. This air movement carries away all the dust generated during the cleaning operation, permitting the operators to work in a practically dust-free atmosphere. Dust from the shakeout units is drawn into four wet-type dust collectors (Fig. 11) located outside the building. There the dust is removed from the air by water sprays.

A mixture of dust and water flows into either of two 60,000-gallon-capacity settling basins which are used alternately. After the sludge separates, the water is pumped out, and the sludge is removed by clam shell bucket, loaded into open gondola cars and transported to a dump.

Sand removed from the castings on the shakeout grids drops into hoppers and from there onto short oscillating conveyors. These carry the sand to the center point of the grids, where they discharge into an inclined rotary sand cooler 6 ft in diam and 30 ft long, where cooling is accomplished with water sprays. Sand from the cooler falls onto an inclined conveyor belt about 70 ft long which elevates it about 10 ft and discharges onto another inclined belt, 101 ft long, which raises the sand about 22½ ft. At the end of this belt the sand from the shakeout is discharged onto the cross conveyor belt (Fig. 12) mentioned earlier in the description of the sand preparation department, and eventually is emptied into the 200-ton storage bin in that department.

In addition to the dust collection at various points where falling sand creates a dust condition, adequate ventilation is provided to insure comfortable working conditions. This is accomplished by five propeller-type exhaust fans mounted in the roofs of each of the buildings. Each fan moves 66,000 cfm, and the combined system can change the air in the buildings 14 times an hour. A separate system attached to the flask and core barrel cooling chamber exhausts the steam to the atmosphere. Heating of the buildings is accomplished with numerous steam-type unit heaters located to cover overlapping areas. The heating system can supply a total of 2,000,000 Btu per hour.



By W. M. HALLIDAY
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The Use and Care of

CRUCIBLES

IN some foundries, handling of graphite crucibles frequently is uneconomical and sometimes results in unsafe operation. The efficient working life of crucibles may be shortened by careless handling, improper storage, poor charging or improper heating upon starting up. Accident risks may be increased greatly by damage accidentally inflicted on crucibles during storage or transportation.

For convenience, this discussion is divided into two parts—one concerning the use and care of graphite crucibles for pit-type furnaces, the second the treatment and safeguards to be observed with crucibles used with tilting-type furnaces.

Storage—Most foundries maintain a stock of crucibles to meet sudden emergencies or to allow new crucibles to season. Numerous operating troubles which occur when the crucible is placed in service originate in unsatisfactory storage conditions.

Crucibles never should be stored outdoors, in contact with dampness or dirt, excessive variations in temperatures, etc. All crucibles should be stocked in a storeroom devoted exclusively to them. If they are placed in close proximity to other pieces of equipment, they are almost certain to be accidentally damaged.

The storeroom should be high-ceilinged, airy, roomy, well ventilated and lighted and as dry as possible. Its temperature should be automatically controlled to between 85 to 110° F. Crucibles should not be stored against a wall, under wall windows or where they may come into contact with steam or gases. Crucibles must be protected from moisture because graphite easily absorbs liquids, causing trouble when the crucible is first heated.

Crucibles should not rest directly on the storeroom floor, regardless of its apparent dryness and good condition. Good ventilation is desirable during storage, but cannot be insured if the crucibles rest upon the floor. It also is not good practice to pile crucibles on top of each other, with pieces of wood between members. This stacking may impose too much weight on the lowest crucible and cause damage.

One of the best means of storing crucibles is to provide a substantial wooden frame. This system separates the crucibles with wooden partitions and insures a reasonably wide clearance between each crucible in storage.

When mounted in such a slatted frame, crucibles should be raised slightly from the floor, about 3 to 5 in., to allow free circulation of air. The frame should give adequate support to the underside of the crucible—not simply support it around the projecting lip at the mouth.

The frame should hold crucibles in an upright position, mouth upwards. Some foundries store crucibles by placing them mouth downward on the floor, without support slabs to raise parts for ventilation purposes. This method is not recommended since moisture can be trapped more easily within the bowl of the crucible and may become absorbed in its walls.

Proper handling equipment should be provided in the storeroom. If individual crucibles removed from storage are dragged across the floor or rolled on the curved outside, serious mechanical damage may result. This may lead to cracking or other faults when the crucible is heated to working temperature.

Lifting equipment always should be specially designed for the job, to insure that lifting is done without damage or risk of accident. Chains, wire-slings or metal grabs or hooks never should be used to grip graphite crucibles. Hempen rope slings should be used, applied so as to support the under side of the crucible at the same time they grip around the periphery.

A convenient handling method is to store each crucible on a pallet designed for picking up by a fork lift truck.

If a crucible is moved by truck from storage to the foundry, it should be provided ample support to its sides and base to cushion shocks and prevent shifting in transit.

All stored crucibles should be inspected regularly for abnormal sweating, mechanical damage or cracking caused by internal strains resulting from temperature variations.

Placing New Crucibles In Service—Many troubles experienced with new crucibles arise because of their unsatisfactory introduction to the heated furnace at the outset of their working life.

With coke-fired pit furnaces, the new crucible never should be placed upon a very hot layer of coke. Instead, there should be a thick layer of new coke at a relatively low temperature upon

Crucibles in tilting-type furnaces require treatment similar to those in pit furnaces

which the crucible will rest. The latter should be empty and gradually allowed to reach a temperature of about 1650° F. A moderate draft may be employed so that the crucible attains this temperature in about three-quarters of an hour.

Heating a new crucible too rapidly frequently results in a condition known as "bumping," distinguished by pieces breaking off the walls of the pot. It is caused by moisture drying out of the wall materials. The moisture changes into steam within the porous walls, expands and causes cracking. If a crucible has been stored in a damp place, it naturally will have absorbed more moisture, and the risks of bumping will be increased. In extreme cases, the internal pressures may completely ruin the crucible.

When a pit furnace is fired by oil or gas, the empty crucible should be started up for heating with a reduced oil or gas jet, for 30 to 40 minutes. The crucible should be raised to about the same temperature as with coke-fired furnaces—1650° F. If the oil or gas jets are turned on at full pressure, the crucible will be heated too quickly and may suffer the same damage mentioned previously.

In many foundries, new crucibles often are brought to a dull redness and maintained at this temperature for 2-3 hours. This practice generally is undesirable because it fails to induce maximum development of the protective glazed finish on the crucible surface. A good surface glaze, formed upon the first heating of the empty crucible, is extremely important in preventing later oxidation and contamination of the molten metal charge. To promote this desirable condition, the crucible should be heated at 1650° F for about one-half hour. Temperature then may be raised rapidly in a few minutes.

Before being heated in the above manner, the new crucible should be closely inspected for flaws, cracks or dampness. Sometimes fine surface cracks develop on walls because of temperature variations during storage; if a crucible in this condition is heated up too rapidly, such cracks may extend to a serious depth and shorten the working life. This surface cracking is most likely to occur when crucibles are stored in an unheated room or an only partially enclosed space during the winter, when temperature variations are the most extensive.

Melting in the Crucible—Considerable care must be exercised when the graphite crucible is loaded with ingots or scrap metals prior to melting. The newly admitted metal should sink smoothly *by its own weight* into the molten bath.

Sometimes the charge may lodge against the sides of the crucible, above the bath; subsequently the material falls, with possibility of serious damage to the walls or bottom of the crucible. Similar damage occurs when wedged ingots or scrapped parts expand as their temperature rises, thereby causing a terrific transverse pressure on crucible walls, which may crack.

As a general rule, a large charge of cold ingots or scrap should not be introduced into a crucible to top up an already molten charge. This practice may cause undesirable fluctuations in the crucible temperature, resulting in such serious internal stressing of walls that they break down prematurely.

Always avoid introduction of moisture-laden ingots or scrap metals into a crucible containing molten metal. Violent internal explosions can occur because of the generation of steam. Entrapped in the molten charge, steam cannot escape without blowing a quantity of the molten metal out of the crucible. Apart from the obvious accident risks thereby involved, severe damage may be inflicted on the crucible.

This hazard is most likely to arise when ill-assorted scrapped parts are regularly fed to the crucible. Long, tubular parts or deeply hollowed components capable of holding undetected moisture are the most suspect. To play safe, preheat all ingots and scrap before charging them.

Similarly, all scrap materials should be carefully checked to insure their freedom from inflammable or similarly deleterious substances, such as solid compounds, solvents, binders, etc., con-

tained in paints, lacquers or other finishing agents.

Such substances may form scum or dross that is difficult to remove. Serious explosions or fires may occur because of gas entrapped within the molten metal. Chemically-noxious fumes also may be given off and attack the glazed finish of the crucible, causing its early breakdown.

Cleaning the Crucible—It is essential to keep the inside walls of the crucible clean. If considerable scrap metal is remelted, bowl surfaces quickly become encrusted with a hard slag or scale, which often adheres tenaciously. Scum or drosses resulting from excessive oxidation due to prolonged overheating of the metal charge, also will collect—often copiously—on internal surfaces.

Such deposits frequently are harmful. For example, great variations may occur in crucible and metal temperatures and impede efficient melting or pouring. Cracking may be set up in crucible walls as a result of more rapid expansion of the dross.

These dross accumulations always should be removed while the crucible is *hot*. If scum removal is undertaken on a cold crucible, pry-bars or even chisels may be required, imposing localized shock-loading on walls of the part. The resultant severe cracking or internal stressing will result in early failure. Moreover, chisels may break through the glazed surface of the crucible.

Another important point is to insure that the *whole* molten charge is removed after pouring. A small residue of metal in the crucible contracts and expands at a different rate from the crucible material and is especially likely to cause cracking during reheating.

Avoiding Wear On Crucible Walls—Several safeguards may be taken to prevent wear on a crucible's inside walls:

1. The molten metal should be heated no higher than necessary to insure efficient pouring.

2. Once at the proper pouring temperature, the metal should be removed from the crucible as soon as possible, without soaking or stewing.

3. If fluxes are added to the melt, some care is necessary; certain substances may induce rapid wear on the walls.

4. Such fluxes should *not* be introduced with the first metal placed in the crucible for melting, but only when the charge is liquid. It then should be applied as quickly as practicable. Instructions of the supplier should be observed.

5. Use the correct type of flux. Avoid a substance likely to attack the glazed protective coating on the inside walls of the crucible.

6. Effective crucible life is determined largely by the length and frequency of its exposure to elevated temperatures. Keep melting times as short as possible. Delays necessary for normal pouring and recharging of the crucible should be minimized. In general, longest crucible working life results from continuous rather than intermittent operation.

7. Graphite crucibles always should be protected against thermal shocks.

Mounting in the Furnace—The manner in which a crucible is mounted within the furnace is important. Unsatisfactory setting may cause inefficiency and loss of working life.

In coke-fired, pit-type furnaces the crucible should stand 3 to 5 in. above the fire-bars, but well underneath the flue outlet channel. If the furnace has a forced draft, mount the crucible on a platform of firebricks to prevent it from settling down on the bars when the coke has been consumed. Should the crucible settle on the fire-bars during heating, the cold air across the bars will impinge on the base of the crucible and may cause wear, internal strains and cracking.

If such a firebrick platform cannot be used, the loaded crucible must be raised frequently during heating to keep it clear of the fire-bars and to avoid contact with the forced-air stream flowing at that point.

Also avoid setting the crucible too high in the pit, particularly a new crucible being heated for the first time. Too high a setting forms an imperfect glaze on crucible walls because of unavoidable temperature variations. Undue oxidation of the crucible material frequently develops from over-high mounting in the pit.

The firebrick platform must be sound, with a top surface area at least equal to that of the crucible base. Surfaces of the platform and the bottom of the crucible should be kept free from coke or dirt fragments. Adhesions of abrasive substances may seriously damage the bottom of the crucible when the heavily loaded part is withdrawn from the pit and rested on the floor.

Careful control over pit furnaces equipped with forced-air draft is essential to prevent excessive air pressure. This condition creates unduly high temperatures immediately under the bottom of the crucible, causing that part to be overheated continuously. Unequal expansion over differently heated portions of the crucible will set up internal

To prevent wear on inside walls of a crucible, the metal should be heated no higher than necessary to insure efficiency in pouring

stresses at the base and increase the danger of cracking.

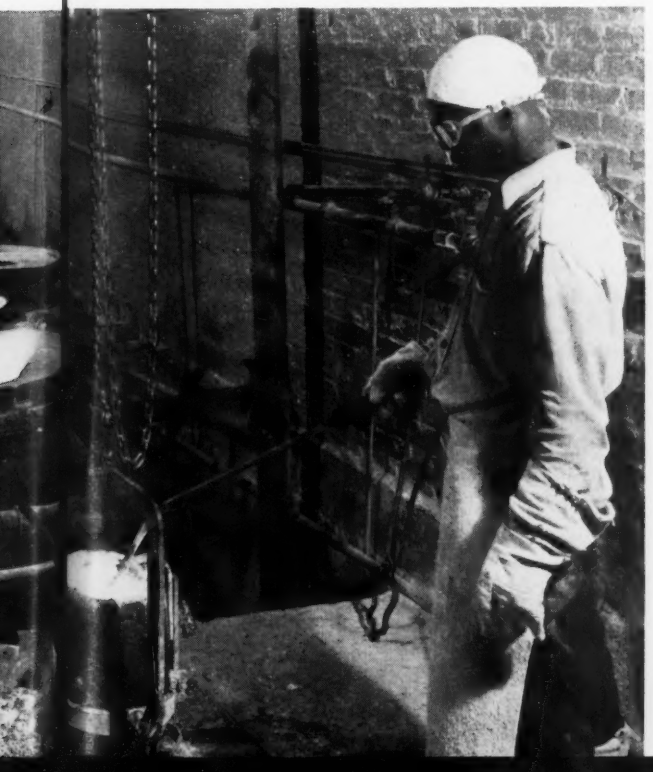
Pit furnaces should be cleaned regularly to remove clinker residues, especially on and around the fire-bars. Large accumulations at this critical point act as heat insulators and increase melting time. This greater exposure to heating, coupled with the more unequalized distribution of heat throughout all portions of the crucible, may impair durability.

Efficiency of combustion of pit-type furnaces fired by oil-vapor or coal gas should be maintained so that melting times remain constant and as short as possible.

With insufficient oil or gas supply and too great an air-blast, melting times increase. The additional exposure to elevated temperatures leads to more rapid oxidation and unequalized contraction of crucible material and generally to a much shorter working life. At the end of heating, cut off the air supply simultaneously with the fuel jet to avoid passing a stream of cold air around the base of the hot crucible.

Tilting-Type Furnaces—Many of the precautionary measures referring to crucibles in pit-type furnaces apply equally to those used in tilting-type furnaces. The following points, however, relate specifically to the care and use of crucibles in tilting-type furnaces.

The crucible should be mounted above a shallow fire, preferably started by wood and coke rather than wholly by coke. When this fire is burning evenly around the crucible, enough coke may be charged to bring the crucible to a temperature of about 1650° F. Until this temperature is reached, however, the air-blast supply should be regulated at from one-quarter to one-third full throttle. These measures insure a steady build up of temperature that distributes heat evenly throughout the new crucible, which should be empty.



Initial heating time should vary according to the size and capacity of the crucible. For crucibles ranging in capacity up to about 250 lb, heating for 40-45 minutes normally is adequate. With crucibles ranging up to 1600-lb capacity, initial heating should extend for about one hour. When the new crucible has been brought to the stipulated temperature, it may be charged directly and the melt commenced.

With gas or oil-fired tilting furnaces, the new (empty) crucible should be brought to a dull red heat, on a fuel input of approximately 60-70 per cent of full delivery.

Duration of the heating period again will depend upon the capacity of the crucible, but generally will follow closely the times given earlier.

Before a new crucible is mounted in a tilting-furnace, its base surface should be tested carefully for flatness. The locating raised-boss should fit smoothly within the recess provided for it in the support stand.

The latter should be bedded to the metal supports upon which it normally must stand in a level position, devoid of all tendencies to rock.

The upper face of the stand which supports the crucible should be coated evenly with cement, care being taken that this material does not pass into the boss recess. The crucible is placed in position as quickly as possible after application of the cement, and proper time is allowed for setting.

Should Be Centered Rigidly

When the cement has set, the crucible should be rigidly centered in the furnace orifice, prevented from moving laterally by the ring of guide bricks built around its outside. These bricks must not make actual contact at any point with the sides of the crucible. Strips of thin asbestos sheet or brown paper may be inserted between bricks and the sides of the crucible to provide the necessary expansion clearance. Use of such shims often simplifies construction of the brick guides.

In crucibles with the usual side spout, sufficient clearance must be provided under the spout for the unavoidable shrinkage in the graphite crucible, shrinkage normally occurring after the first three or four heatings. The spout will tend to move downward, and it moves a considerable distance with very large crucibles.

The spouts also should be long enough to straddle the firing gap and to extend beyond it over the refractory lining at that point in the furnace. The extension pouring trough, which has to be constructed in fire-clay at this point, should match up with the tip of the crucible spout, but must be so formed as to allow uninterrupted downward movement of the spout upon shrinkage.

If such features are not provided in the crucible mounting, distortion, cracking or serious displacement may occur quickly after setting-up because of restrictions on natural shrinkage. Thus crack and wear defects may originate at the very outset and impair the length and quality of working service obtained.

Simple Tests Can Help Cut

LABOR TURNOVER

By ROBERT B. KONIKOW

U. S. Dept. of Labor Photo

Labor turnover is an expensive item in the operation of any business. Here's a way to decrease turnover, without charge, through testing procedures which match a man's capabilities against the demands of the job

NO BUSINESSMAN likes turnover in his plant, but few realize how expensive it can become. The cost of turnover is made up of a number of small items but, according to a recent survey, it all adds up to an average of $208 per hourly employee! This may seem high until you start to figure the cost of recruiting, of maintaining a personnel office of sufficient size, of training programs, of extra supervision, of loss from damage to material or equipment, of make-up pay to bring the wage up to the minimum, of the extra unemployment compensations taxes, and even of the effect of mishandling a good customer's order.

A frequent cause of turnover is the failure to match the capabilities of a man against the requirements of the job. This is particularly true in hiring trainees or apprentices, or in a tight labor market, when standards might have to be relaxed. A tool which could cut down this cause of turnover would be a valuable one indeed. Actually, as thousands of employees have learned, such a tool is available at no additional cost.

This tool is known as GATB, from the initial letters of its formal name—General Aptitude Test Battery—and is pronounced gatby. It was developed after World War II by the Bureau of Employment Security of the United States Department of Labor. It was first released to the various state employment services, which do the actual administering, in 1948, and now it is available in all the states, through most of the 1600 local offices.

Gatby is a group of tests, taking 2½ hours to administer, and giving individual scores on nine important aptitudes. Study has shown that for each of several hundred different occupations, scores on three or four of these aptitudes can effectively predict success of an individual. How effectively can be seen from a study conducted by a large midwestern manufacturer.

This study was started by selecting workers who had been hired in the normal way by the personnel office. They had, as is usual, based their selection on the application blanks, the job records, and the considered judgment of the personnel people. Another group had been tested by the local state employment service and had the necessary qualifications for the job being filled. The personnel office used the test results in picking from this group. The two groups were then sent into the plant in a routine manner. They were given the same training, indoctrination and supervision. Nobody outside of the personnel office actually knew to which group a worker belonged.

After the probationary period was over, and after enough time had elapsed so that things settled down and an adequate judgment could be made, the records of the two groups were compared. In every respect, the test-hired group was far superior to the gate-hired one. It had a turnover rate of only 2.1 per cent per month, compared with a 4.7 per cent rate for the gate-hired workers. In production, the test-screened group lead by 575 units to 450. The test-screened group was easier to train, with a cost of 6 cents per dozen against 18.1 cents for the other. Perhaps the most effective comparison, from the standpoint of cost, was the difference in make-up pay, made necessary by the fact that few workers, paid on a piece-work basis, can produce enough to meet the minimum wage requirements. The gate-hired group required $13,000 make-up pay, against only $6000 for the test-selected group.

Few employers have been able to conduct a study so carefully controlled. Others have tried the battery, noticed an improvement, and have adopted the method enthusiastically. In one plant, test-screened workers have reached acceptable production levels after two or three days on the job, against earlier experience of that many weeks. In another plant, gate-hired workers averaged 18 weeks to reach 96 per cent of standard; after introducing tests, this time was cut to 12 weeks. Reductions in turnover, in training costs, an increase in productivity and job satisfaction have been reported from many parts of the country and from many industries.

It's No Magic Tool—GATB, the cause of all this, is no magic tool, nor is it a cure-all for personnel problems. It is, however, a carefully organized method of getting at one of the factors that make for job success—the basic aptitudes. While there have been hundreds of tests developed, each measuring some human characteristic, or aptitude, the Department of Labor psychologists have reduced the number which they consider important to nine. Some were eliminated because they were too much like others and effectively measured the same thing. Others were too limited and applied to only a handful of occupations. These nine—general intelligence, verbal aptitude, numerical aptitude, spatial aptitude, form perception, clerical perception, motor co-ordination, finger dexterity, and manual dexterity—were finally chosen. In most occupations, three or four of these are key aptitudes.

To measure these aptitudes, a group of 12 tests is used. Seven of them are paper and pencil tests, and the other five involve peg-boards or other apparatus. The entire battery takes about 2½ hours, and can be given to small groups of applicants at one time. A person who takes the entire battery ends up with scores on all nine aptitudes.

While these individual scores are of interest to the individual, they don't help much in placement or in guiding him to a particular occupation. To do that we must know the requirements of the job. This requires actual work in the field, which has been carried out by one of the state employ-

TYPICAL TEST QUESTIONS

These are typical of those used in seven of the tests that make up GATB. They measure 6 of the 9 aptitudes for which scores are obtained. The other 3 aptitudes are measured by 5 tests that cannot be reproduced here, since they use peg-boards and other apparatus. In the actual test, there are many more questions in each part than can be answered in the allotted time.

The nine aptitudes are general intelligence (G), verbal aptitude (V), numerical aptitude (N), spatial aptitude (S), form perception (P), clerical perception (Q), motor coordination (K), finger dexterity (F), and manual dexterity (M).

PART A

If the two names in each line below are exactly the SAME, circle the S in the answer column. If they are DIFFERENT in any respect, circle the D.

Long & Co.—Long, Inc.	S	D
Johnson & Smith—Johnson & Smith	S	D
Armstrong F. C.—Armstrong F. G.	S	D
National Agency—Nat'l Agency	S	D
Fox Inc.—Fox Icn.	S	D
George Gorman—George Gorman	S	D

This test gives your score for Q:

PART B

Solve these problems, circle the correct answer.

ADD	2 3 –	6	5	4	10	none of these
SUBTRACT	7 4 –	3	11	2	0	none of these
MULTIPLY	17 6 —	23	103	102	112	none of these
ADD	12 37 41 —	100	92	110	29	none of these
DIVIDE	12÷372	21	31	32	22	none of these

This gives you part of your score for N.

PART C

Solve these problems, circle the correct answer.

It takes one-half hour to do one piece of work. How many pieces can be finished in 8 hours?

8 4 16 12 none of these

John spends one-sixth of his weekly salary for food. He earns $35.40 a week. How much does he spend for food?

$9.00 $5.90 $6.25 $5.92 none of these

Tom makes 75c an hour. How much does he make in 7 hours?

$7.00 $5.00 $4.25 $5.25 none of these

A piece 1½ feet long is cut off a board 4½ feet long. How long is the rest of the board?

2 feet 1½ feet 2½ feet 3½ feet none of these

A room is 10x12 feet. A rug 6x9 feet is laid on the floor. How many square feet of floor are left uncovered?

54 33 64 66 none of these

In addition to completing, along with PART B, your score for N, this also forms part of your score for G.

PART D

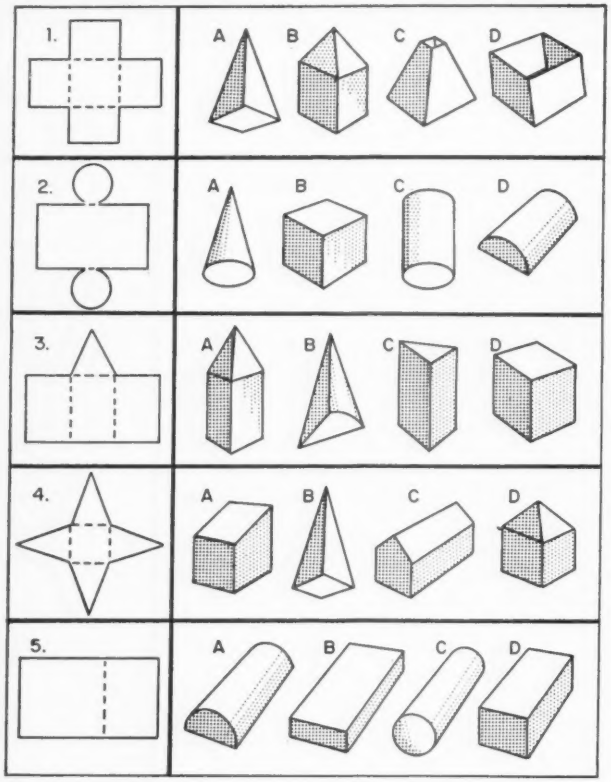
In each group of words there are two which go together, either because they have the SAME meaning or OPPOSITE meanings. Write the numbers of those words in the answer spaces.

1. big	2. large	3. dry	4. slow	_&_
1. dreary	2. loyal	3. ancient	4. disloyal	_&_
1. mild	2. correct	3. wrong	4. similar	_&_
1. open	2. fall	3. start	4. finish	_&_
1. amusing	2. tiny	3. awkward	4. funny	_&_
1. examine	2. help	3. inspect	4. discover	_&_

This forms the second part of your score for G, and by itself gives your score for V.

PART E

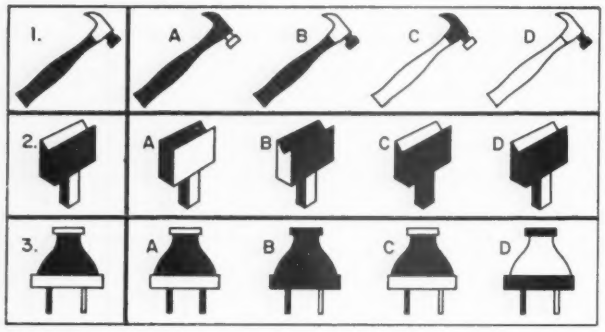
On the left are drawings of flat pieces of metal. They can either be folded on the dotted lines, or rolled, or both. They can be shaped into just one of the shapes to the right of each piece. Circle the letter under the correct one.



This is the final test making up your score for G, and by itself gives your score for S.

PART F

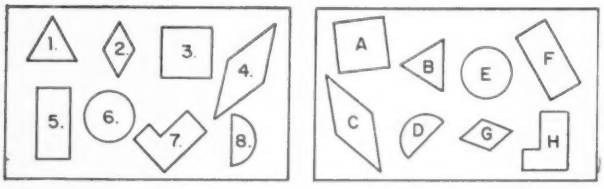
On the left are drawings of objects. Pick out from the group to the right of each that one object that is exactly the same as the first one. Circle the letter under the one that matches.



This test, with PART G, below, gives your score for P

PART G

In the box on the left are eight numbered figures. These same figures have been rearranged in the box on the right, and labelled with letters. Pick out the lettered form that matches each numbered form exactly, and circle the proper letter in the answer column.



1:	A	B	C	F		5:	F	H	D	A
2:	G	C	B	A		6:	D	E	C	H
3:	E	H	A	F		7:	A	B	H	E
4:	G	B	H	C		8:	B	F	E	D

This test, with PART F, completes your score for P

ment services. If we wanted to establish the pattern required by a molder, the first step is to select a group of molders, working at the same kind of job, under similar supervision. Once the group is selected, its supervisors rate the men on their job performance. In order to get a fair sample, only men who have passed through their probationary stage, and who can be considered established in a career, are used. This group was then given the GATB.

Modern statistical methods were applied to the results. The scores achieved on each of the nine aptitudes were compared with the supervisor's ratings. Some of the aptitudes seemed to be directly related to performance on the job; others had little relationship. By using combinations of these key aptitudes, and the critical score in each, it became possible to distinguish, from the test scores alone, between the high and the low producers in the group. For the bench molder, these key aptitudes turned out to be general intelligence, spatial perception, and manual dexterity.

Molding Jobs Studied—At present, only a few jobs that are peculiar to the foundry industry have been studied, and these are various types of molders. Other jobs are being studied and data compiled, to be released when completed. Other studies await the availability of adequate sample groups, which must be furnished by industry, and an interest in a particular state for having the studies made. The results are made available nationally, after checking and correlation through Washington, so that all services have data rapidly.

A great many jobs within a foundry are not peculiar to this industry, especially maintenance people and front-office staff. Such jobs as electrician, telephone operator, draftsman, billing-machine operator and similar tasks have been studied, and the results are available to the personnel office of a plant.

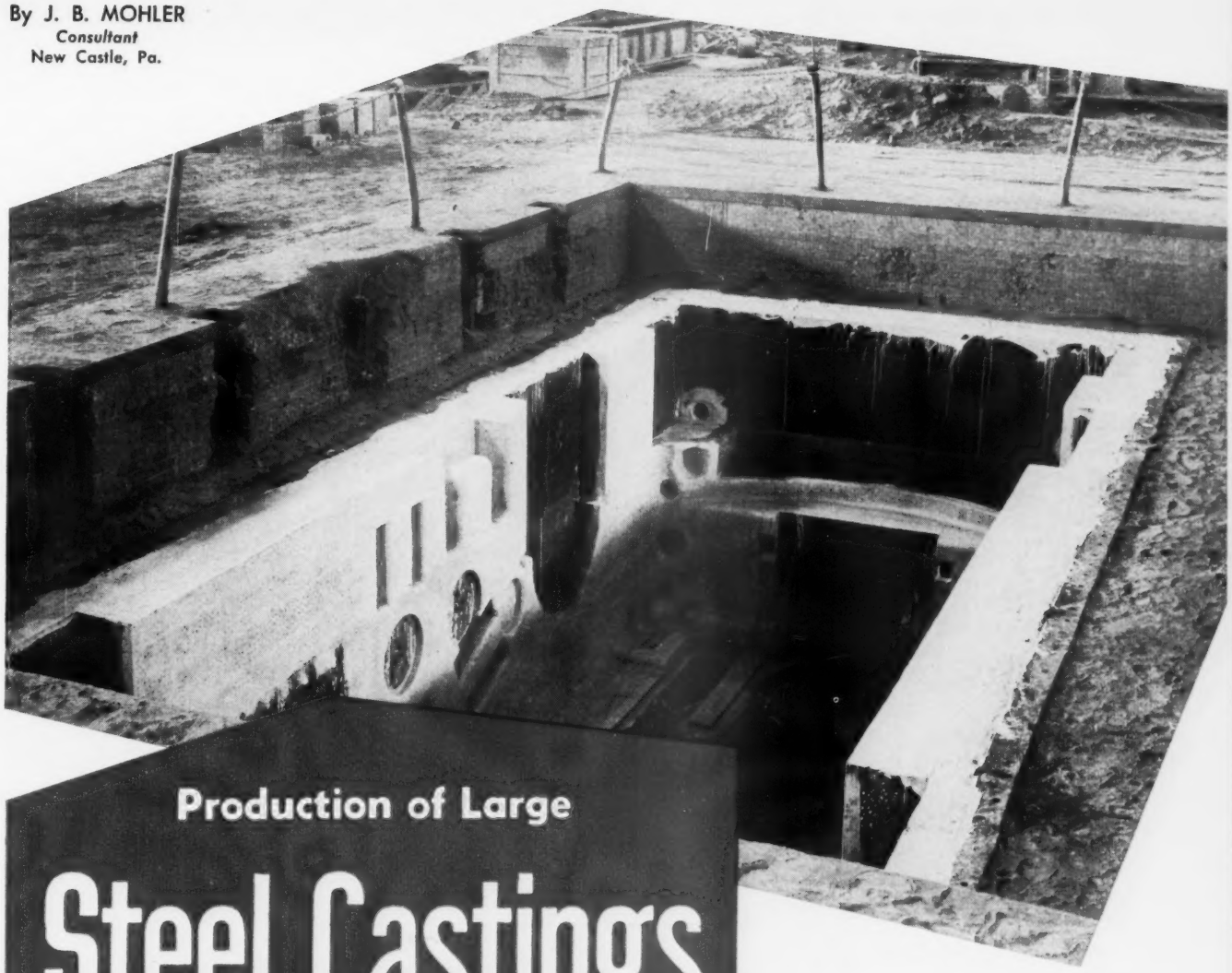
One interesting development of the study is the creation of families of jobs. These are occupations which, although in widely different fields, require the same key aptitudes. For example, jobs in the same family as the molder include the loom fixer in a textile mill, the pressman in a printing plant, a shipfitter, or a refrigeration machanic. This means that a man with a successful work history in any of these field has the necessary aptitudes to be a molder, and should be retrainable without difficulty.

Measures Only Aptitudes—Tests like the GATB do not make a mechanical matter out of hiring. They measure aptitudes only, and individual judgment is required to measure interest in the particular job, or a man's physical capabilities.

But GATB can be of great help, whether your vacancies run in the hundreds, or only one a month or so. It is a service that is rendered without charge, either to you or to the applicant. Since it is basically a state-operated system, details of its availability vary from state to state. At the other end of your telephone is your local State Employment Service. They can tell you more about GATB and your particular personnel problems.

By J. B. MOHLER
Consultant
New Castle, Pa.

Production of Large Steel Castings



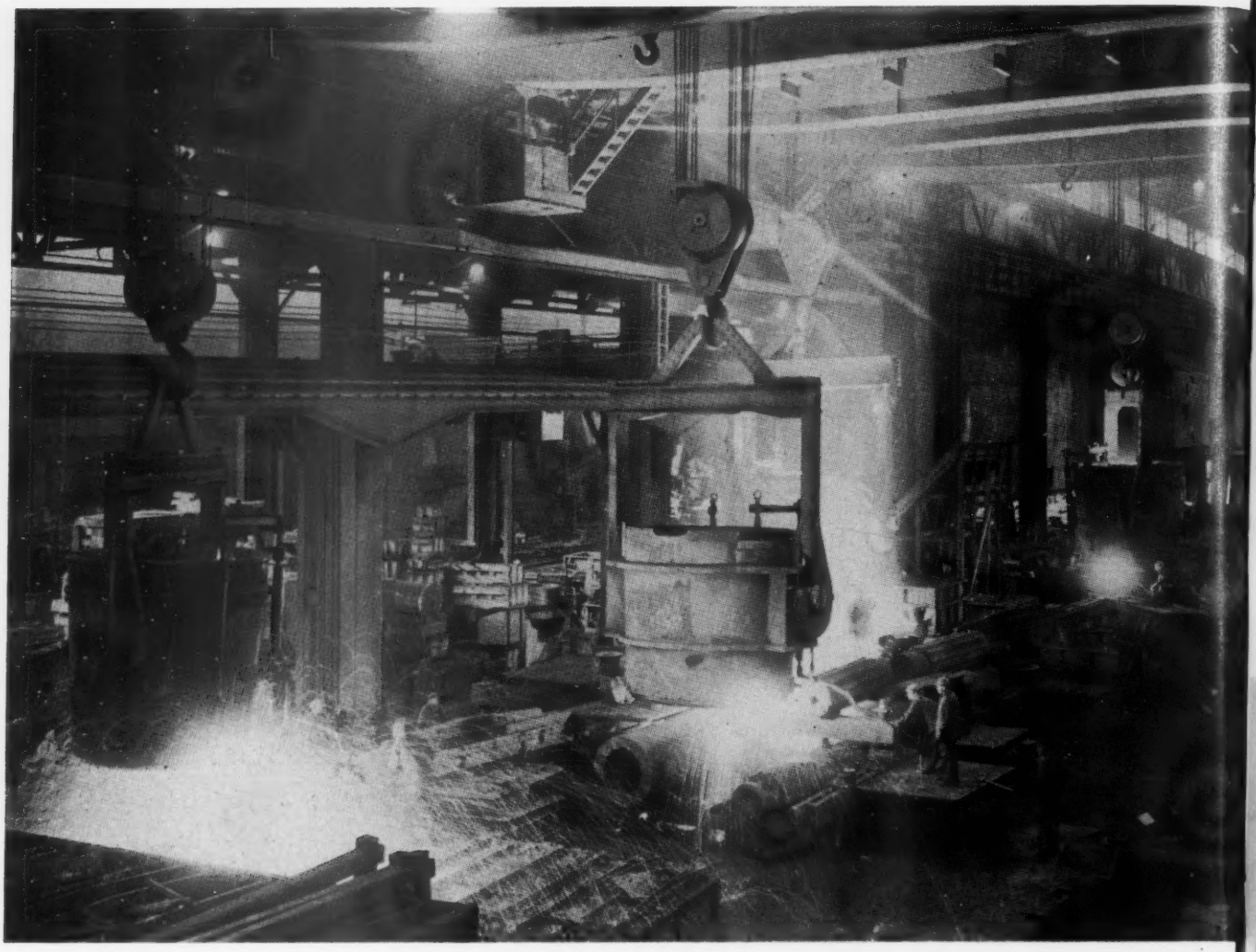
Finished mold for a large casting required over 1¼ million lb of sand in pit 16 ft deep, 18 ft wide, 39 ft long. Building pattern required 2500 man-hours

LARGE steel castings, such as the 13 castings of over 150 tons each which comprise an Alcoa 35,000-ton forging press, cannot be produced according to a definite operating procedure. Each large casting has to be treated individually, at least until such a time as a number of identical castings have been made.

Considerable planning, co-ordination and skill are required to pour up to 365 tons of steel to form a finished casting of 481,000 pounds at 66 per cent yield. A casting of this size was first poured at the New Castle, Pa., plant of United Engineering & Foundry Co. in November, 1946. Perhaps a tradition of meeting large orders is a part of such a process.

Many steel castings have been produced by the company with average rejects totaling only 0.3 per cent. A low reject figure can be maintained partially through the practice of pouring sample castings and sawing sections to determine the most effective location of risers, gates and chills. However, on a large casting program such a procedure is not practical. The successful production of large castings is a matter of combining previous experience with known facts about shrinkage and directional solidification.

Work on the foundry floor starts with the building of a pattern, with proper allowance made for shrinkage as determined with the aid of the original prints. For instance, a forging press casting 51 ft 11½ in. long required a pattern 52 ft 3½ in. long to produce a casting within ¼-in. of finish size, exclusive of allowance for machining stock. Shrinkage allowances and stock for machining are specifically determined by design. The foundry superintendent, Jack Gallagher specifies gating and



Pouring casting with four ladles suspended from overhead cranes. Total of 600,000 lb of metal was poured in 4-1/3 minutes. Two pourings were made through 30-ft runners

heading necessary to do the job.

As work proceeds on the pattern a concrete-lined pit is selected. A steel tank is placed inside of the concrete lining as a protection against moisture. The tank is lined with brick, laid-up with mortar, and sand is rammed into the bottom of the pit with an air hammer to obtain a good foundation. Steel plates are placed over the sand to reinforce the bottom, and more back-up sand is rammed in to obtain the proper pattern height. At this time final details for mold construction can be planned so that gaggers do not interfere with heads and tie bars. Step gates can be placed to get the hot metal to the right place and blind risers can be added to avoid shrink porosity in areas difficult to feed.

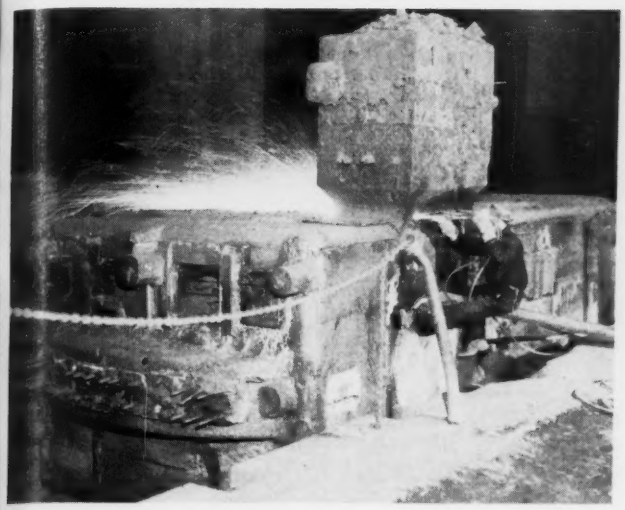
Although the fundamental design of the casting is determined by the design of the pattern, the guarantee of quality begins with the marking of the pattern on the foundry floor. The patterns for gates, risers and head pad are fastened onto the marked pattern proper.

Sand control is a routine matter, since the standards for moisture and permeability determined for other castings apply to the large castings. Moisture is controlled at about 5 per cent, and fines are avoided to obtain specified mold hardness and sand characteristics.

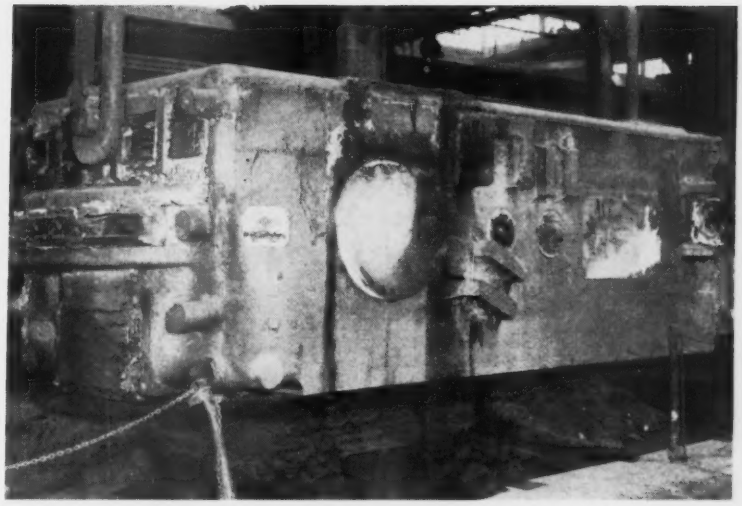
Facing sand is rammed into the bottom of the pit as a final step in preparing the foundation. After the bottom sand is in, a flask is placed inside of the pit. The pattern is placed and faced with about 2 in. of facing sand by shovel and by hand. Two large sandslingers are available for general foundry work, but it has been found that some hand ramming is necessary on the largest work.

Sand is rammed between the pattern and the pit. Reinforcing rods are placed in the back-up sand to within a few inches of the pattern, and sand is continuously and progressively rammed to the height of the parting line. The cope flask then is put on and tie bars and gaggers are placed to hold the sand in the cope.

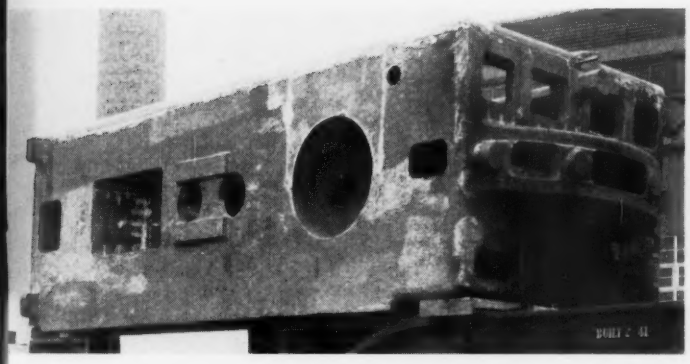
The cope side is faced with facing sand and risers are positioned on the cope side of the pattern. After the cope is finished, the cope section is removed to a finishing stand and the pattern is drawn. Next the sand is smoothed with a trowel, sharp corners are rounded and brackets are cut.



Removing last of three heads by burning between drilled holes. The 1-in. bars reinforced cores



Casting was removed from pit only after it had cooled for two months. It is partially cleaned



Finished casting, on 90-ft freight car, weighs 236 tons, is press frame for mechanical forging press

All of the mold surface, except the core prints, is nailed with foundry nails to hold and reinforce the sand. Finally the mold is sprayed with silica mold wash.

The sand is now dried to remove moisture within at least 2 in. of the mold surface. Before the portable circulating hot air driers are placed on the cope, the riser openings are covered. Air at 700° is circulated through the mold cavity and partially exhausted through the gates for up to 120 hours. Care is taken to keep the hot air under pressure so that it will reach all areas of the mold surface.

The final dry concrete-like surface is usually 3½ to 4 in. thick and is sufficiently hard that it can be walked on without fear of damage. After the mold is dry, the cope is removed and dry sand cores are set. In a recent 170,000-lb casting 88 of these cores were required. The finished mold surface is again treated with silica mold wash.

When the cores have been inserted and final surface preparation completed, the cope is replaced and clamped. Steel binders are used to clamp the cope, and the pit is braced by hooks embedded in the concrete to maintain rigidity at the high molten metal pressures. A large casting requires the labor of four men 12 hours just to tie down the cope.

On the largest castings all of the furnace capacity is required, consisting of one 100-ton, two 50-ton, and one 35-ton acid open-hearth furnaces.

The furnaces are charged consecutively according to the size of the heats, and all to them must be tapped simultaneously into four ladles. The largest ladle is poured with two nozzles and each of the others simultaneously with one nozzle. The casting is poured in about four minutes with a metal temperature of 2780 to 2800° F. The metal will be into the heads by this time but the risers only partially filled. About 35 tons of additional metal is melted and the risers are filled at intervals of four to five hours until full. Feeding may continue for 24 hours, and it has been estimated that complete solidification takes place in 30 to 36 hours.

Annealing Operation Takes Time

After the casting has been allowed to cool sufficiently it is lifted from the pit. The heads are removed by drilling a series of holes and torch cutting. Most of the sand and the cores are removed with a hydraulic blast of sand and water, the remainder by chipping hammers.

The casting is annealed at 1600 to 1650° F for one hour per inch of section thickness and furnace cooled to 350° F in 11 to 12 days. After annealing, the casting is cleaned with a shot blast and any required welding is done. Because of careful planning very little welding for minor defects is required. The casting finally is stress relieved at 1150° F.

The author is indebted to the United Engineering & Foundry Co. for permission to publish this article and particularly to Howard Klugh for his assistance in explaining the details.

QUESTIONS

Penetration encountered with large brass castings . . . .

Blows from shell core . . . . . Protecting mold face

Gray iron melts brass . . . . . Casting must be fed

QUESTION We have trouble making large brass castings weighing 500 to 3500 lb. This work is new to us as far as size is concerned. Metal penetrates the mold. We use half old and half new sand with 1 part pitch to 20 sand, and coat with blacking. Metal is 85-5-5-5 and poured at about 2150° F. Can you give a sand mixture for the castings mentioned and also for smaller ones weighing about 200 lb? Recently we installed a new 4000-lb, oil-fired furnace and get a lot of gas holes. Any suggestions will be appreciated.

ANSWER Without any knowledge of the characteristics of the sands you are using, it is impossible to supply a solution to your problem. It appears to us that your best procedure would be to test the old and new sands to determine grain sizes and distribution, permeability, green strength, etc. This would enable you to make suitable adjustments to remedy the situation.

In general, the principal cause of penetration is too coarse a sand, and perhaps that may be your trouble. With dry-sand work the sand can be much lower in permeability since moisture is not a problem. Perhaps instead of penetration you are having cutting or washing of the sand due to a weak sand; in this case addition of a small amount of clay or bentonite would help.

Another possibility is that you are using too much phosphor-copper in deoxidation — especially since you mention presence of gas holes. It should not be necessary to add more than 1 oz of phosphor-copper (15 per cent P) per 100 lb. Reduction of pouring temperature also might help, and we suggest that you try pouring at 1950° instead of 2150°F.

As far as gas holes are concerned, we believe your melting conditions need examination because apparently you have a reducing atmosphere in the furnace, instead of a slightly oxidizing one. While it is best to determine whether or not the atmosphere is oxidizing by analysis of the furnace gases, you can get some idea by holding a cold piece of slab zinc in the flame for a minute or two. If a black deposit forms, it is an indication of incomplete combustion, and more air should be supplied to the burner. If the flame gives a yellowish deposit on the zinc, it indicates oxidizing conditions.

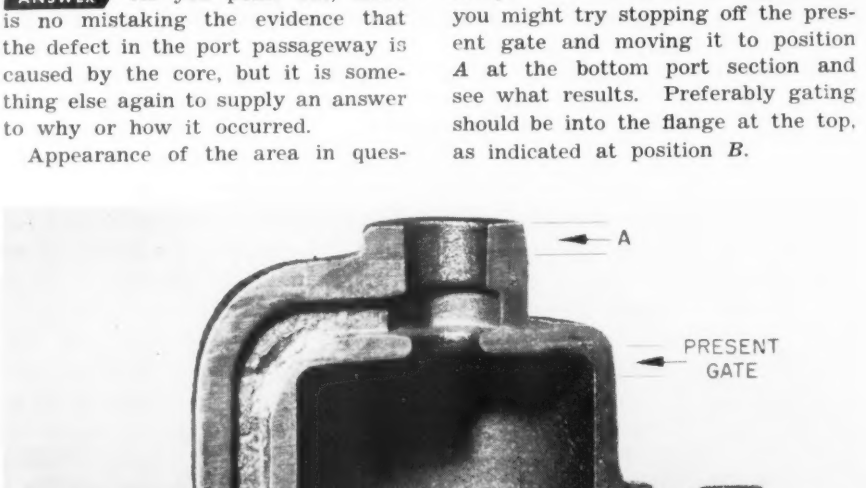
Small Core Causes Difficulty

QUESTION We are sending a portion of a gray iron steam trap casting made with a shell core in a green sand mold. Piece is the cope side and is gated in the drag below the area ground away and marked in red. There are three castings in the mold, gated from a runner in the same manner. You will notice on the branch that leads from the bottom to the side port that a blow condition has occurred; but what is even more troublesome is the fact that sand has burned into the casting at this point. This condition did not exist on the drag half of the casting where, if the metal had flowed under the core and up against the underside of the branch core, we normally would expect this trouble.

ANSWER As you point out, there is no mistaking the evidence that the defect in the port passageway is caused by the core, but it is something else again to supply an answer to why or how it occurred.

Appearance of the area in question with the presence of sand indicates that a boiling action took place and we suspect that the cause was an excess of resin binder in the core in the particular spot. However, it should be pointed out that considerable heat is generated in the area. This is because the first metal into the cavity, following the path of least resistance, flows from the gate across the section which forms the "bottom" of the casting; generally distribution of metal to the remainder of the cavity is from that section.

While the hot metal rises from the lower level of the cavity to the top (and you would expect blowing from the core on the drag side), it may be that the gases tend to escape freely upward until the metal covers the core; then the trouble occurs. Another factor in the blowing is that this branch core, as you term it, is relatively thin and heats up much faster than the larger body core. The rapid heating develops gas quicker than it can be carried away. As a matter of experiment you might try stopping off the present gate and moving it to position *A* at the bottom port section and see what results. Preferably gating should be into the flange at the top, as indicated at position *B*.



Steam trap casting shows core blow opposite gate entrance

and ANSWERS

Coating for Permanent Molds

QUESTION We will appreciate receiving any information you might have on permanent mold coatings for aluminum alloy and bronze castings.

ANSWER Coatings for permanent molds usually are composed of some type of refractory material with or without some lubricating agent—in some cases the refractory acts as a lubricant also. Materials used include whiting; clay; red mud, a by-product in recovery of alumina from bauxite; rouge; graphite, etc.

These materials may be used singly or in combination with water as the vehicle, and with or without sodium silicate (water glass) as a suspensory agent. Numerous proprietary mold coatings are on the market, and we advise their use in preference to trying to develop one yourselves. Names of manufacturers may be found in the advertising section.

If you want to experiment you could try the following: Heat 1 gallon of water to boiling and add 10 oz whiting, 1 oz graphite powder, and 12 oz sodium silicate—stirring well. Allow the mixture to cool, and always stir well before applying to mold face, which should be heated to around 700° F. With a new mold, coating is sprayed on in two thin coats; each coat is rubbed down with steel wool, and then a final thin coat is applied. Heavier coatings are brushed on gates and risers.

Proper coating or painting a mold surface requires considerable skill since it may be advisable to vary the thickness of the coating in various parts of the mold.

Pours Gray Iron Around Brass

QUESTION We are supplying one of our customers a gray iron water valve casting weighing about 4½ lb, with metal thickness varying from ⅛ to ½-in. Customer bores interior of valve and inserts a short piece of ⅛-in. wall brass tubing to form a seat. Recently the customer requested that the valve seat be cast-in to eliminate machine work and sent us a casting from another source in which that had been done. We made a few molds with the brass seats on the dry-sand core and found that the brass melted completely when the molds were poured. We fractured the casting mentioned and examination indicated that the insert seat was a red brass casting rather than yellow brass tubing. Apparently no refractory coating was used. Can you suggest a technique for pouring gray iron around the brass valve seats?

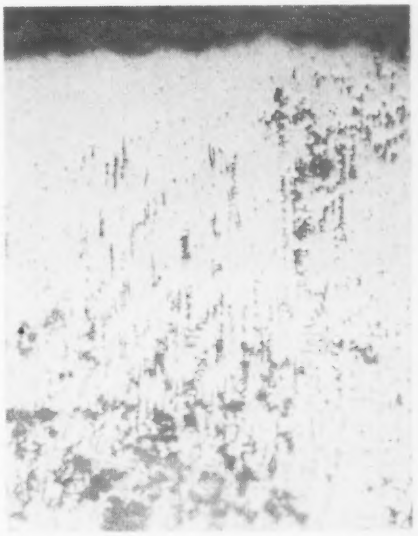
ANSWER While it is possible that the difference in melting points between the red brass and the yellow brass may be the cause of your difficulty, it appears to us that it results from a combination of factors. Indications are that the 85-5-5-5 alloy melts at around 1830°F while a 67 Cu-33 Zn brass melts at about 1720°F. Hence, it is possible that iron poured at say 2500° might melt the yellow brass, but not the red brass. Therefore, you might examine your pouring temperature, and see whether lowering it has any effect.

However, we suspect the main difficulty lies in your gating of the valve casting, and is such that the molten gray iron fed into the cavity impinges directly on the insert, subjecting it to a continuous flow of hot metal which raises the insert to and beyond its melting point. If the gating cannot be changed, then you will have to place some kind of a chill inside the brass insert; this will increase the over-all heat capacity to the point where not more than a slight surface fusion occurs at the interface of insert and the casting. Chill need not necessarily be solid. Perhaps a ring chill with a ⅛-in. wall which could be rammed up with the core might give the desired results. You would have to experiment to determine the most suitable chill thickness.

Lack of Feed Cause of Defect

QUESTION We are sending several sections of a small cylindrical casting showing dark-colored areas in the fractures. We have had various opinions and we would like yours on whether the defect is internal shrink due to insufficient feeding, a hot tear due to strain, or tearing occurring in heat treatment. Alloy is Co-Cr-Cu-Fe. Sand mix is composed of silica sand around 80 AFS grain fineness, 0.75 per cent treated cellulose, 2 per cent linseed-base oil, and 0.1 per cent water. Internal cores are reamed out to the greatest possible degree to permit the casting to contract easily.

ANSWER Examination of the fractured surfaces leads to the opinion that the defect is internal shrinkage caused by lack of feed. However, since the composition of the alloy is different from an alloy steel a more definite confirmation was desired.



Micrograph confirms shrinkage theory

This was accomplished by cutting down and polishing the fractured surface, and then examining it under the microscope. The accompanying illustration at 25 diameters, un-

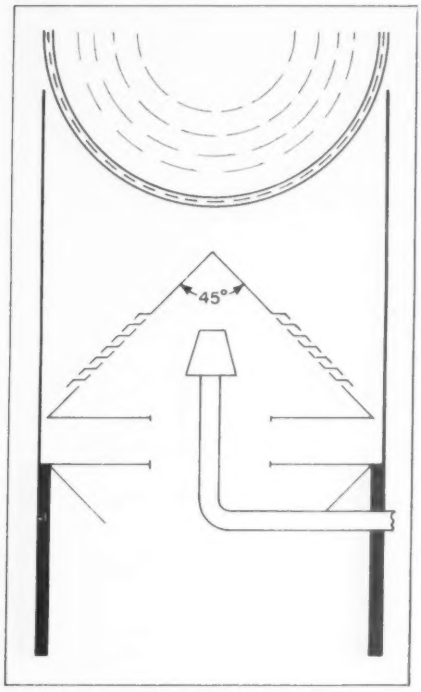
Dark areas on fractured section indicate possible shrinkage

etched, indicates the typical intercolumnar shrinkage voids. Remedy, of course, is to arrange the gating so that adequate feeding will occur.

Reclaiming Shell Mold Sand

QUESTION We are remodeling a small part of our foundry in Mexico for shell molding. The sand we are using costs too much to be purchased in the U. S., and in Mexico there isn't any. We know in England they use small furnaces to recover sand from used molds. We would appreciate any detailed information concerning the construction of a furnace of this class to recover 500 lb sand in 8 hr.

ANSWER While we have seen reference to furnaces for reclamation of sand from shell molding, we know nothing as to construction except that it requires only firing at the beginning for a short period and continues operation with air only. This indicates that after the resin bond is once ignited combustion is self-perpetuating. It appears that the furnace or unit is designed with a gas or oil burner for ignition and some method of feeding in the raw material and taking away the finished product without plugging up the burner openings.



Suggested resin burnoff furnace design

Simplest experimental arrangement to do this is shown in the accompanying illustration. It uses an ordinary 50-gallon oil drum as the shell and a perforated sheet steel cone (45-degree apex) inside the drum. Base of the cone is ½-in. less in diameter than the drum, leaving ¼-in. clearance all around. Cone is perforated with a series of staggered slots—made with a chisel from the inside. The idea is to provide hooded openings which permit heat and flame emergence, but prevent entrance of fine sand. A series of slots or perforations in the bottom of the oil drum around the edge allows the sand to drop onto a deflector ring around the outside of the bottom, and into a container.

With this unit we suggest first charging large pieces of shell molds to provide an "open" burden to permit easy penetration of flame and heat. Once the charge is burning briskly, finer material could be added at the center to determine how it can be handled. Suggested use of an oil drum and sheet steel cone is to minimize costs while determining whether or not the unit will operate satisfactorily.

Another possibility of reclaiming the sand would be use of a horizontally rotating drum fired with a burner at one end. Inside of the drum would contain flights or vanes to pick up the sand and let it shower down through the flame and heat from the burner. In this case we believe the sand shells would have to be crushed to ½-in. size or so before feeding into the furnace. Drum would be mounted at a slight angle to the horizontal so that the sand would be carried slowly from one end of the drum to the other where it would be discharged.

Sealing Porosity of Castings

QUESTION In the November, 1954 issue under "ABC of Foundry Practice" mention is made of impregnation of pressure castings. We would appreciate receiving more detailed information and the source of supply of resins, etc.

ANSWER Impregnating practice depends upon the number of castings to be handled. When castings are impregnated individually, the part is first cleaned and all openings except one are sealed. Sealant is poured in the remaining opening and an air pressure line is attached. Pressure is applied until the sealant oozes through the casting walls.

Another method you might try consists of attaching a hose and applying a vacuum instead of pressure. In the vacuum method the sealant is applied to the entire outside of the casting or to the local porous area.

A third method is to dip the castings in the sealing agent—usually a synthetic resin or plastic—let drain and then bake to polymerize, condense or harden the material.

One other method centers around the use of an autoclave. In this method, batch lots of castings may be impregnated at one time. Castings are placed in the autoclave and subjected to a vacuum. One manufacturer uses a 29½-in. vacuum to remove air and moisture from the casting walls. Then an impregnating solution is introduced into the autoclave. This sealant covers the castings. Compressed air at 100 psi is then applied, forcing the solution into the casting walls. After this operation the castings are removed from the autoclave and rinsed. An oven curing operation lasting 10 minutes at 300° F following the rinsing is recommended by one manufacturer.

Sources of resins and equipment may be found in the advertising section of FOUNDRY.

Temperature Effect Upon Clay

QUESTION We derived considerable profit from previous information given to us relative to deformation in shell molded castings, and now would like some advice pertaining to the small iron and bronze sand foundry we operate in France. We have been told that it is advisable to add to synthetic sand additions of bentonite previously oven dried at a temperature not above 80° C (176° F). While we do not use synthetic sand, we also have been told that the same principle applies to natural sand in additions of new sand in that it contains colloidal clay, a "living matter" which partially deteriorates at a temperature above 100° C (212° F). We have been unable to find anything in the technical literature to substantiate that, and would appreciate your opinion.

ANSWER While it is possible to change the properties of clays by heating to temperatures at which the chemically combined water or water of crystallization is driven off, temperatures you mention appear far below those in which such reaction would occur. In 1951 Cuthbert and Dyer (*American Foundryman*) carried on some tests with bentonite dried at or heated to various temperatures and found that up to and at 400° C (750° F) the green and dry compression strengths of sands bonded with the bentonites were unaffected. At 450° C (840° F) the dry compression strength decreased while at 600° C (1110° F) both dry and green compression decreased.

Although we did not find similar work relative to natural sand or clays, Ries in his book *Clays—Occurrence, Properties and Uses* with reference to dehydration of clays points out that it may begin below 150° C (300° F) and extend to 650° C (1200° F), but most dehydration does not take place until a temperature of at least 450° C (840° F) is reached.

A typical Iroquois product . . . a marine motor housing.

"We recommend this machine to all foundries"

Says Mr. Walter Vierthaler, Vice-President of Iroquois Foundry Co., Racine, Wisconsin, where high quality grey iron castings are produced. Here approximately 300 tons of mulled sand are conditioned each night with a Royer NYP-E Sand Separator & Blender.

Front end loaders deliver the sand from the muller to the molding station. The original practice was to dump this sand on the molders heap, caked and packed from mulling and bucket loading. Now the sand is charged into the large hopper of The Royer instead. No time has been added to the cycle of operation, but the molders heap has been transformed to a cool fluffy pile. When one floor is completed, the highly portable Royer is moved to the next. Scrap loss and cleaning room time are down and casting finish has been improved.

All mulled sand can be vastly improved by proper aeration and fluffing. The best place for this operation is at the molding station where the sand will not be compacted by further handling prior to the molding operation. For a bucket loader type of operation we recommend the new Royer NY series. Write for bulletin NY-54 today.

Foremost in Sand ROYER *Conditioning Equipment*

ROYER FOUNDRY & MACHINE CO. 159 PRINGLE ST. KINGSTON, PA.

MEN OF INDUSTRY

FRED B. RIGGAN
. . . joins Texas Steel Co.

RUSSELL J. GEITMAN
. . . plant engineer, Link-Belt

NILES L. KOHLER
. . . ACCO plant manager

WILLIAM E. JONES
. . . joins Josam Mfg. Co.

FRED B. RIGGAN, recently a foundry consultant, has joined Texas Steel Co., Fort Worth, Tex., as chief metallurgist. From 1938 to 1953 Mr. Riggan was associated with the Key Co., East St. Louis, Ill., where he became vice president in charge of research and development. Previous connections include National Cast Iron Pipe Co., Tarrant, Ala., and Stockham Valve & Fittings Inc., Birmingham. Active in committee work with the AFS, ASTM, and SFSA, Mr. Riggan is the author of many technical articles and has appeared frequently before conference and convention groups.

♦ ♦ ♦

Edwin C. Evans has been named vice president-assistant general manager, Behr-Manning Corp., Troy, N. Y. Mr. Evans attended Rensselaer Polytechnic Institute and joined the company in 1934. He was named a vice president last year. **William I. Clark Jr.** has been appointed assistant to the president of Behr-Manning in addition to his duties as company secretary, a position he has held since 1952. A graduate of Harvard University, he entered the company in 1933.

♦ ♦ ♦

Thomas Stanton has been appointed assistant sales manager for the eastern district, Basic Refractories Inc., Cleveland. Prior to joining the company in 1945 as a sales-service engineer, he was associated for 10 years with Youngstown Sheet & Tube Co., Youngstown, O. **George J. Peer** has joined the sales staff of the Chicago district office. A graduate of Purdue University, he was previously associated with Republic Steel Corp., Canton, O.

Russell J. Geitman has been appointed chief engineer for Link-Belt Co.'s plant in San Francisco, where he will direct design of all equipment. Since 1948 he has been engaged in similar work at the Chicago Pershing Road plant. Mr. Geitman was graduated from Illinois Institute of Technology and previously was engaged in sales work at district offices of the company in St. Louis, Cleveland and Chicago.

♦ ♦ ♦

Niles L. Kohler was recently appointed plant manager of American Chain & Cable Co.'s malleable iron foundry in York, Pa., a unit of the company's American Chain Division. A graduate of Pennsylvania Business School, Mr. Kohler joined the company in 1916. Since 1937 he was office manager of the York malleable foundry.

♦ ♦ ♦

S. Whitney Dickey, formerly Eastern district sales manager, Brake Shoe & Castings Division, American Brake Shoe Co., New York, has been appointed assistant vice president of the division. Mr. Dickey was graduated from Yale University and joined the company as an apprentice in 1948.

♦ ♦ ♦

Joseph L. Ballash has retired as chief engineer, Sterling Grinding Wheel Co., Tiffin, O., following 32 years with the company. He will continue in a consulting capacity.

♦ ♦ ♦

Norris H. Schwenk has been appointed general manager, and **James J. Nelson,** sales manager, Foundry Department, Baldwin-Lima-Hamilton Corp., Philadelphia.

William E. Jones has joined Josam Mfg. Co., Michigan City, Ind., as works manager. After leaving Michigan State College, Mr. Jones was associated with Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich., and several automotive casting foundries. In recent years he has been a foundry equipment sales representative.

♦ ♦ ♦

Frank R. Falkenhagen was appointed superintendent of the material control department, Saginaw Malleable Iron Plant, Central Foundry Division, General Motors Corp., Saginaw, Mich. He joined the plant in 1935. **Steve Spess** has succeeded Mr. Falkenhagen as superintendent of the coreroom. With the plant since 1947, he was graduated from General Motors Institute in 1952. **Robert W. Leppien** was appointed to Mr. Spess' former position as superintendent of standards and methods engineering. With the plant since 1940, he was formerly superintendent of the material control department.

♦ ♦ ♦

Norman N. Breyer has joined Continental Foundry & Machine Co., East Chicago, Ind., as metallurgist for the Armor Division. A graduate of Michigan College of Mining and Technology, he received his master's degree from University of Michigan. Mr. Breyer was formerly chief of the Armor Section, Detroit Arsenal.

♦ ♦ ♦

L. A. Estes was recently named president, and **W. C. Hale Jr.,** executive vice president, Dodge Steel Co., Philadelphia. Other officers elected include: **R. F. Bradshaw,** financial vice president-secretary; **A. S. Breit-**

This Combination Has Won for Woodward Nation-wide Recognition for UNIFORM QUALITY IRON and DEPENDABLE SERVICE

—Our own source of coal
—Our own source of ore
—Our own coking plant
—Our own completely integrated operations
—Our own inter-connecting transportation system
—Our own independent policies

Your inquiries are invited

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Phone Bessemer, Ala. 5-2491

or Sales Agents for territory north of Ohio River:

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609 Bona Allen Building, Atlanta 3, Ga.; 230 North Michigan Avenue, Chicago 1, Ill.; First National Building, P. O. Box 538, Cincinnati 1, Ohio; 1154 Union Commerce Building, Cleveland 14, Ohio; 1203 Ford Building, Detroit 26, Mich.; P. O. Box 335, Duluth 1, Minn.; 412 Guaranty Building, Indianapolis 4, Ind.; 407 Foshay Tower, Minneapolis 2, Minn.; 70 Pine Street, New York 5, N. Y.; 1500 Walnut Street Building, Philadelphia 2, Pa.; 1910 Clark Building, Pittsburgh 22, Pa.; 796 Arcade Building, St. Louis 1, Mo.

Woodward Iron Company

WOODWARD, ALABAMA

Independent Since 1882

CHESTER R. ZALEWSKI
. . . Buffalo Pipe & Foundry v.p.

THOMAS B. HEALY JR.
. . . assistant secretary-treas.

PATRICK A. HIGGINS
. . . secretary, Buffalo Pipe

MILTON D. EMERY
. . . production mgr.

haupt, vice president-sales; **M. D. Leopold,** treasurer; and **N. G. Kriebel,** assistant treasurer.

♦ ♦ ♦

Chester R. Zalewski has been elected vice president, Buffalo Pipe & Foundry Corp., Buffalo. **Patrick A. Higgins** has been named secretary, and **Thomas B. Healy Jr.,** assistant secretary and assistant treasurer. The three new officers have also been named directors of the company. **Milton D. Emery** has been made production manager. **Carl E. Gruber,** who has been serving as secretary, continues as treasurer-general manager.

♦ ♦ ♦

Albert P. Gagnebin has been appointed assistant manager of the nickel sales department, and **Edward B. Bitzer** has been named assistant manager of the nickel alloys department, International Nickel Co., New York. **Keith D. Millis** has succeeded Mr. Gagnebin as head of the Ductile Iron section of the company's Development and Research Division. Mr. Gagnebin joined the Bayonne, N. J., research laboratory in 1932 and since 1949 was associated with the Development and Research Division in New York. Mr. Bitzer was in charge of consumer sales of mill products in Pittsburgh, Cleveland and Chicago, from 1931 until 1935, when he was transferred to the New York office. Until recently he was in charge of industrial, consumer and light industry sales. Mr. Millis, first associated with the Bayonne Research Laboratory, in 1951 was transferred to the Development and Research Division in New York as a member of its Ductile Iron section. In 1952 he and Mr. Gagnebin were named jointly to receive the Peter L. Simpson Gold Medal Award of the AFS for outstanding work and development in the field of spheroidal cast iron.

♦ ♦ ♦

Charles H. Carroll has retired as director of purchasing, Ford Motor Co., Dearborn, Mich. Mr. Carroll, who has been with Ford 37 years, will continue with the company, working with the vice president of manufacturing. **James O. Wright,** who has been assistant general purchasing agent for the Ford Division, succeeds Mr. Carroll as director of purchasing. He joined the company in 1946.

♦ ♦ ♦

George H. Starmann Jr. was recently appointed assistant sales manager, Apex Smelting Co., Chicago. A graduate of Illinois Institute of Technology, he joined the company in 1937. He has been in the sales department since 1944 and prior to that was in charge of the magnesium department.

♦ ♦ ♦

Jay W. Kent recently was appointed sales engineer in Chio, Davis Fire Brick Co., Oak Hill, O. For 20 years he was associated with Pyro Refractories Co., there, in that capacity.

♦ ♦ ♦

Carey Lindsay, until recently general plant superintendent, Mexico Refractories Co., Mexico, Mo., has been transferred to Niles, O., as plant manager of Niles Fire Brick Co., recently acquired by the Mexico com-

ALBERT P. GAGNEBIN
. . . nickel sales, INCO

EDWARD B. BITZER
. . . INCO nickel alloys

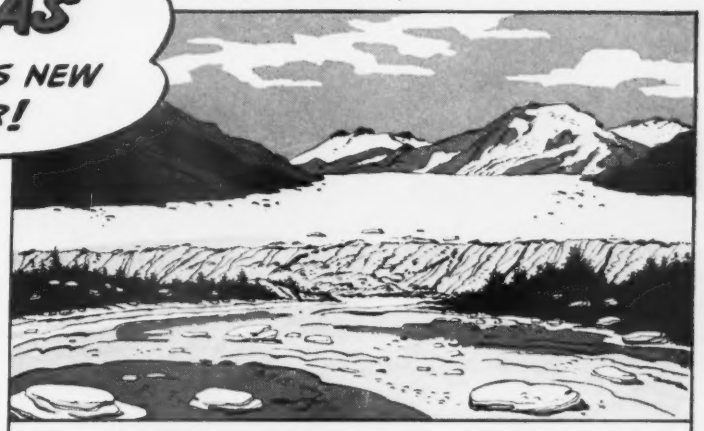
KEITH D. MILLIS
. . . Ductile Iron Section head

CAREY LINDSAY
. . . refractories plant mgr.

NO. 1 OF A SERIES
ON THE HISTORY OF ABRASIVES
BY CHICAGO WHEEL & MFG. CO.

ABRASIVES ARE AS OLD AS MAN... YET AS NEW AS TOMORROW'S NEWSPAPER!

The earliest traces of mankind indicate no knowledge of abrasion. But, somewhere in the prehistoric ages man learned of the power of grinding down one stone with another. Thus was born one of the world's greatest mechanical aids, the forerunner of today's abrasive industry.



MOTHER NATURE was the first abrader. The glaciers of the ice age, their undersides studded with rocks of all sizes which were held in the ice with considerable firmness, acted as a gigantic grinder in passing over the earth. They abraded, grooved, and polished the rock and terrain. Actually, the glaciers could be likened to the modern grinding wheel, with the imbedded rocks representing the grain and the ice forming the bonding material.

DID MAN learn of abrasives from observing the action of glaciers? Probably not. Scientists tell us that man first knew nothing of the mechanics of abrasion, depending on breaking and chipping rock to form his crude tools and weapons.

FIRST REALIZATION that objects could be worn down by abrasion is supposed to have occurred when aborigines were grinding grain on the simplest form of grain mill. A man (or woman) noticed how the top stone, usually a round smooth one, eventually wore a groove in the larger flat stone.

ACTION of the stones wearing on each other suggested the use of abrading to help shape and form weapons and tools. Archaeologists have found spearheads and other implements that evidence the smoothing action obtained by rubbing stone on stone.

The polishing job that took prehistoric man weeks of toil now could be done in seconds with a modern grinding wheel. Engineering and manufacturing abrasive wheels to parallel man's desire for improvement has been the job of Chicago Wheel for over 65 years.

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Manufacturers of abrasives, precision grinding wheels and mounted points for industry.

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MEN OF INDUSTRY

T. W. KUHN
. . . Bohn Aluminum executive

GORDON L. McMILLIN
. . . joins Canadian foundry

G. A. GILBERTSON
. . . Frank G. Hough executive

R. L. BEYERSTEDT
. . . executive vice president

pany. He worked at the refractories plant in Mexico, during the summers of 1937 and 1938, and after graduation from Ohio State University in 1939, entered the company in a full-time capacity.

♦ ♦ ♦

T. W. Kuhn, since 1949 vice president-sales, Bohn Aluminum & Brass Corp., Detroit, was recently elected executive vice president. Mr. Kuhn joined the company 26 years ago and has been a director since 1950. **Clyde M. Adams** was elected vice president. He has been secretary and a company director since 1949. **F. M. Taylor,** treasurer and a director, has retired after 35 years of service. **E. K. Mann Jr.,** formerly vice president-controller, was named vice president-treasurer and will serve the unexpired term of Mr. Taylor as a director. **W. J. Lane** has succeeded Mr. Adams as secretary.

♦ ♦ ♦

H. E. Ehlers Jr. has been appointed general sales manager, **R. C. Brock,** industrial sales manager, and **D. C. McMillin,** district manager, Pacific coast district, Joseph Dixon Crucible Co., Jersey City, N. J. A graduate of Lehigh University, Mr. Ehlers joined the Crucible and Refractories Division of the company in 1935. He has been Pacific coast district industrial sales manager since 1952. Mr. Brock was appointed an industrial sales representative in 1948 and has been Pacific coast district manager since 1951. Mr. McMillin has been sales representative of the Pencil Products Division since 1952.

♦ ♦ ♦

James E. Stopford, formerly associated with Clark Bros. Co., Division of Dresser Operations Inc., Olean, N. Y., has been appointed chief field engineer, Mechanical Industries Inc., Pittsburgh.

♦ ♦ ♦

Gordon L. McMillin was recently appointed assistant vice president, Steel Foundry Division, Canadian Car & Foundry Ltd., Montreal, Que. He will be in charge of foundry operations at the company's Longue Pointe Works in Montreal. Since 1951 Mr. McMillin had been works manager, General Steel Castings Corp., Granite City, Ill., Canadian associate of Canadian Car & Foundry Co.

♦ ♦ ♦

G. A. Gilbertson, formerly vice president in charge of sales, advertising and service, Frank G. Hough Co., Libertyville, Ill., has been appointed executive vice president and general manager. **R. L. Beyerstedt,** until recently vice president and chief engineer, has been named executive vice president in charge of engineering and product development.

♦ ♦ ♦

William S. Stephens, formerly district construction engineer, Pennsylvania Department of Highways, was recently appointed application engineer, Materials Handling Department, Syntron Co., Homer City, Pa.

♦ ♦ ♦

Roy P. Williamson was recently appointed director of sales, the Morgan Engineering Co., Alliance, O. Mr. Williamson attended the University of Michigan. For the past 14 years he was associated with the Buda Co., Harvey, Ill., division of Allis-Chal-

H. E. EHLERS JR.
. . . general sales mgr.

D. C. McMILLIN
. . . Dixon district mgr.

R. C. BROCK
. . . industrial sales mgr.

ROY P. WILLIAMSON
. . . joins Morgan Engineering

"TELL-ALL" panel gives you four advantages

The *Foundromatic* dryer gives you all the advantages of dielectric drying plus the operational convenience and simplicity of "Tell-All" control.

1. Meters, lights, buttons are panel mounted at eye level, enabling operator to keep on top of operation at all times.

2. Electrode control permits adjusting to the physical variances of cores.

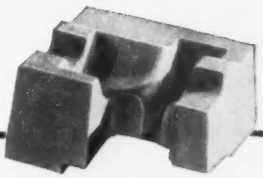
3. Electrical overloading is prevented by the belt-loading control. Conveyor stops when load is too great.

4. Automatic grid control assures correct drive to oscillator tube regardless of oven load.

Advantages of Dielectric Drying Over Oven Drying

Drying time measured in minutes — smoother core finishes — superior shakeout characteristics — clean, cool core rooms — elimination of core storage — 60% fuel savings — all these advantages are yours with dielectric drying.

Compare features and operating records of the various dielectric dryers available. You will discover, because it is easier to operate, the *Foundromatic* dryer augments and multiplies the inherent advantages of the dielectric method.



Six minutes is all it takes to dry this core in a *Foundromatic* dryer. The job would take 70 minutes in a conventional oven.

Get all the facts on dielectric core drying — call your nearby Allis-Chalmers district office or write Allis-Chalmers, Milwaukee 1, Wisconsin. Ask for Bulletin 15B7306B.

A-4450

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ALLIS-CHALMERS

CARL R. HEAGSTEDT
. . . pres., Tousey Varnish Co.

PAUL D. SULLIVAN
. . . Le Roi Division sales

JAMES R. CRAIN
. . . joins Frederic B. Stevens

RAYMOND W. WIEHSNER
. . . Tabor Co. sales mgr.

mers Mfg. Co., Milwaukee, where he was general sales manager of the Railroad-Industrial Division.

♦ ♦ ♦

Carl R. Heagstedt was elected president, Tousey Varnish Co., Chicago, succeeding the late William R. Alcorn, who was president since 1924. Mr. Heagstedt joined the company in 1920, became secretary in 1928 and vice president in 1935. **Bradford W. Alcorn,** with the company since 1932, was named vice president and will continue as sales manager. His former duties as secretary will be performed by **Harry D. Wright,** who continues as director of purchases. **Ralph F. Kendig** remains treasurer of the company.

♦ ♦ ♦

Paul D. Sullivan has been named assistant sales manager, Le Roi Division, Westinghouse Air Brake Co., Pittsburgh. He will be located at division headquarters in Milwaukee. A graduate of Mt. Angel College, Mr. Sullivan was previously associated with Gardner-Denver Co., Quincy, Ill., as field engineer in Oregon and southern Washington. Since joining the Le Roi Division more than a year ago he was in charge of contractor sales in New York.

♦ ♦ ♦

James R. Crain, formerly associated with Presstite Engineering Co., St. Louis, has been appointed representative in southern Illinois and the St. Louis area, Frederic B. Stevens Inc., Detroit. He was previously with National Bearing Division, American Brake Shoe Co., St. Louis, and Walworth Co., New York.

♦ ♦ ♦

Floran L. Meacham, for the past 4 years general works manager, Crosley Bendix Home Appliance Division, Avco Mfg. Corp., South Bend, Ind., was recently elected president-general manager, Simonds Worden White Co., Dayton, O. **H. R. Simonds,** former president, was elected chairman of the board, and **Dr. Frank R. Henry,** was named vice chairman.

♦ ♦ ♦

J. W. Swatek, formerly a regional sales manager, A. P. Green Fire Brick Co., Mexico, Mo., was recently appointed general sales manager. He joined the company in 1933. **M. D. McClain,** until recently sales manager of the Woodbridge, N. J., division, was named assistant vice president. **W. K. Stevens** has succeeded Mr. McClain as Woodbridge Division sales manager. **H. L. Beynon, W. W. Cockrill, O. H. Read** and **C. H. Coats** have been appointed assistant general sales managers.

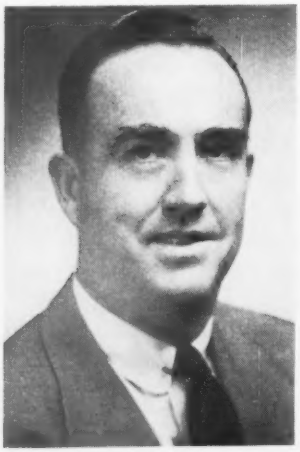
♦ ♦ ♦

Raymond W. Wiehsner was recently appointed sales manager, Tabor Mfg. Co., division of Turbo Machine Co., Lansdale, Pa. Associated with the Tabor company for 42 years, for the past 20 years Mr. Wiehsner was in charge of molding machine design. Tabor Mfg. Co. became a division of Turbo Machine Co. in October.

♦ ♦ ♦

Robert D. Barron has been appointed manager of the National Plant, National Radiator Co., Johnstown, Pa., succeeding **John E. Harris,** who has been named manager of engineering at the company's Viking Air Conditioning Division, in Cleve-

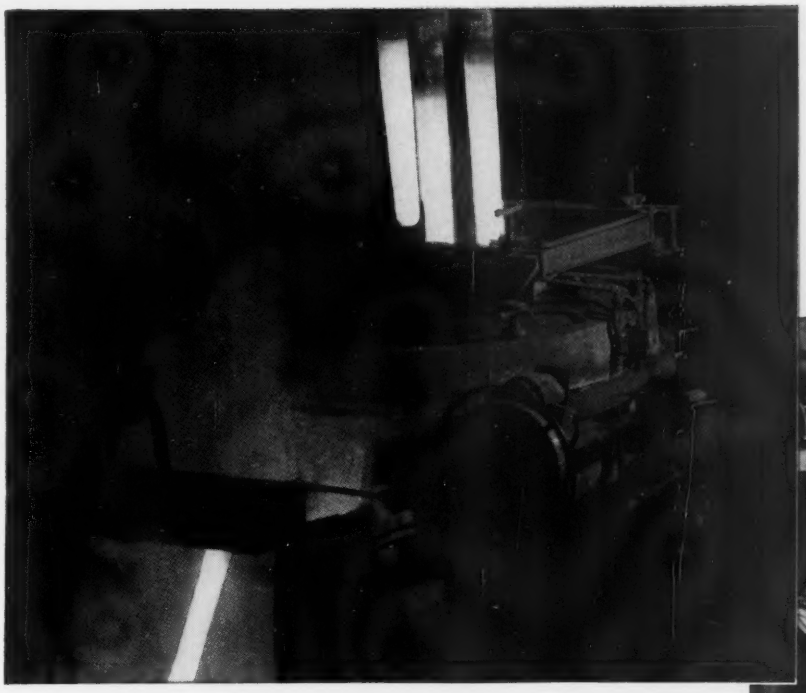
FLORAN L. MEACHAM
. . . heads Simonds Worden White



J. W. SWATEK
. . . general sales mgr.

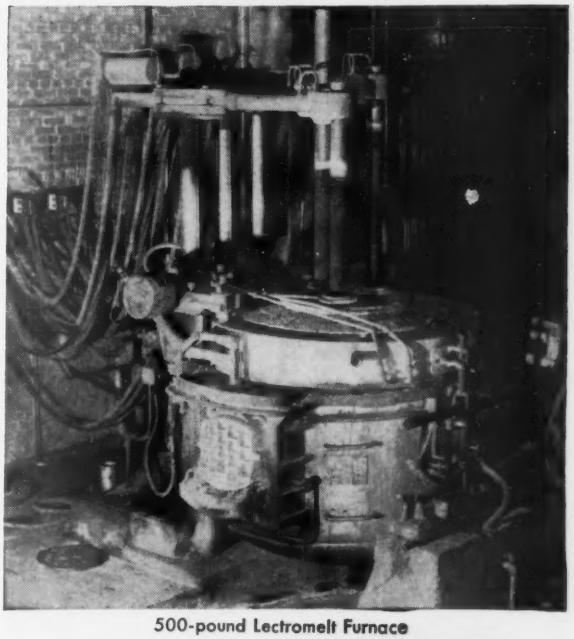
M. D. McCLAIN
. . . assistant vice pres.

ROBERT D. BARRON
. . . becomes plant mgr.



3,000-pound Lectromelt Furnace

1,000-pound Lectromelt Furnace



500-pound Lectromelt Furnace

We like the FLEXIBILITY provided by our 3 Lectromelt furnaces

SAY ELECTRO-ALLOYS DIVISION, AMERICAN BRAKE SHOE COMPANY, ELYRIA, OHIO

Electro-Alloys can make quick shifts in alloys melted and weight of metal cast, thanks to the flexibility offered by these three Lectromelt* Furnaces. By keeping the small furnace on Ni-Resist exclusively, they avoid the need for wash heats and assure integrity of the alloy.

They cast a great many different alloys, and the castings range in weight all the way from a few ounces to 13,000 lbs., calling upon the additional capacity of other furnaces.

Precise control of melting conditions is inherent in Lectromelt equipment. Whether you're working with iron, plain carbon or alloy steels, a Lectromelt Furnace will give you this advantage.

Lectromelt engineers will answer your questions and supply you with catalog data on Lectromelt Furnaces—25 lbs. to 150 tons. For Catalog No. 9, write Pittsburgh Lectromelt Furnace Corporation, 314 32nd Street, Pittsburgh 30, Pa.

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*REG. T. M. U. S. PAT. OFF.

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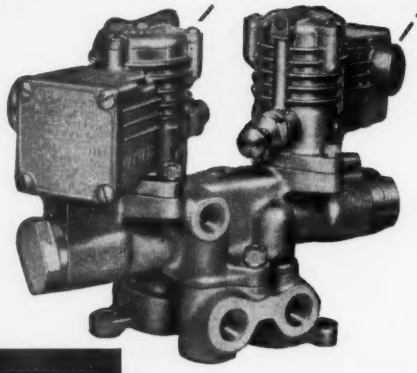
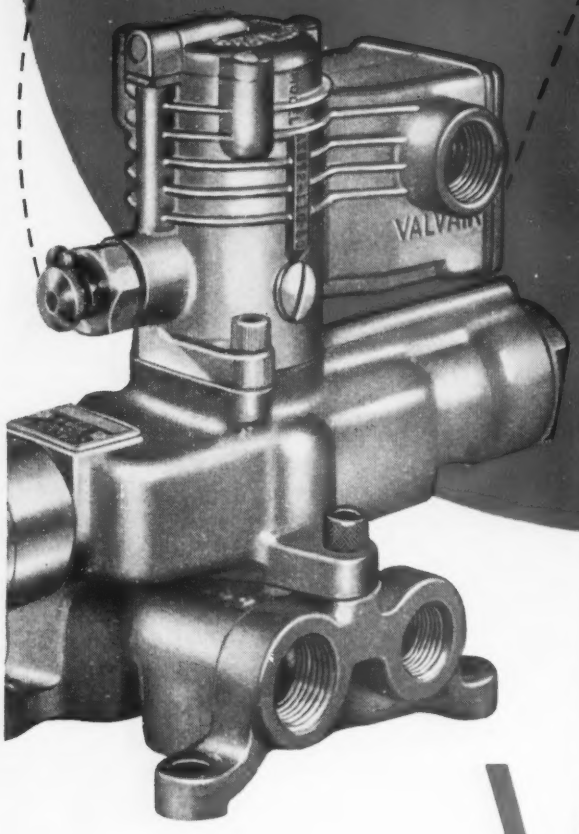
WHEN YOU MELT... *Lectromelt*

DOUBLE

solenoid pilot operated control valve



SPEED KING



Valvair is proud to announce another advancement in the field of automation—The Double Solenoid Speed King Control Valve, designed especially for both the Original Equipment Manufacturer and the End User. This development proves that, more than ever before, Valvair is the name to keep in mind when you order solenoid-operated valves.

Features: Momentary electrical contact—35 to 200 psi pneumatics with internal pilot supply—35 to 150 psi hydraulics with internal pilot supply—Vacuum—300 psi pneumatics and hydraulics using external or remote pilot supply—4-way body—foot or manifold mounting—basic ⅜" and ¾" sizes.

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land. A graduate of Pennsylvania State, Mr. Barron joined the company in 1949 as foundry engineer. Prior to becoming manager of the National Plant, Mr. Harris was associated with the company's Plastic Metals plant, Johnstown.

♦ ♦ ♦

Ted Operhall, for the past year vice president-general manager, Misco Precision Casting Co., Detroit, has been elected president. Mr. Operhall joined the company in 1948 as project engineer and subsequently became chief engineer and assistant manager. Previously he was associated with Ford Motor Co. and the research laboratories of Bendix Aviation Corp., Detroit. He is currently serving as president of the Investment Casting Institute.

♦ ♦ ♦

Matthew J. Delehaunty has been named manager of mechanical goods sales, United States Rubber Co., New York, with headquarters at Passaic, N. J. Mr. Delehaunty joined the company in 1922, became a mechanical goods salesman in 1937, and Pittsburg branch manager in 1949. He was made manager of industrial sales last year and manager of commodity sales last June.

♦ ♦ ♦

Don S. Permar, until recently sales manager of stationary air compressors, Le Roi Division, Westinghouse Air Brake Co., Milwaukee, has been named field sales manager. Mr. Permar attended Carnegie Institute of Technology and joined Westinghouse Air Brake in 1945 as a pneumatic engineer. The following year he became special representative for the Industrial Products Division.

♦ ♦ ♦

A. T. Olsson, formerly service engineer in the Detroit office, Acheson Colloids Co., has been named assistant sales manager with headquarters in Port Huron, Mich., main office of the company. **G. C. Giles,** veteran assistant sales manager, takes on added administrative responsibilities.

♦ ♦ ♦

Frederick W. Merry has been appointed sales engineer in the Foundry Division, Union Metal Mfg. Co., Canton, O. A graduate of Case Institute of Technology, for the past 4 years he was in the engineering department and foundry division operation.

♦ ♦ ♦

Arthur Herbener has been appointed product metallurgical engineer, and **Theodore H. Crane,** associate research mineralogist, at the Research Center, Cambridge, O., opened last year by Vanadium Corp. of America, New York. A graduate of Lehigh University, Mr. Herbener was formerly foundry engineer, Bethlehem Steel Co., Bethlehem, Pa. Mr. Crane was graduated from University of Kansas and recently spent 2 years with the U. S. Army Corps of Engineers.

J. F. WALLACE, appointed associate professor, Department of Metallurgical Engineering, Case Institute of Technology, Cleveland, as reported in February.

Jess Edwards was recently appointed Detroit resident sales manager, Pioneer Foundry Co., Jackson, Mich. **Nelson Dumas,** formerly vice president, Trojan Castings, Jackson, has been appointed sales engineer for Pioneer. **Lawrence Fagerlund** continues as metallurgist.

♦ ♦ ♦

Allan Nichamin, formerly manager of the Detroit aluminum producing plant, Federated Metals Division, American Smelting & Refining Co., New York, has been named manager of the national aluminum department recently established by the company. He will continue to be located in Detroit. He is vice president of the Aluminum Smelters' Research Institute. **Donald L. LaVelle** was appointed assistant manager of the aluminum department, with headquarters at the Perth Amboy, N. J., plant. Mr. LaVelle was graduated from University of Washington and received his master's degree from Montana School of Mines. Until recently he was research metallurgist in the company's central research laboratory.

♦ ♦ ♦

Ernest E. George, formerly manager of magnetic products engineering, Carboloy Dept., General Electric Co., Detroit, has been appointed manager of the department's permanent magnet plant in Edmore, Mich. A graduate of Princeton University, since joining General Electric Co. in 1933 he has been engaged in magnetic material applications.

♦ ♦ ♦

R. E. Vaughn has been appointed Chicago district manager, Peninsular Grinding Wheel Sales Corp., Detroit. **R. J. Kervick** has been named district manager in Philadelphia.

♦ ♦ ♦

Robert M. Stecker has been appointed Wisconsin representative, grinding wheel sales, Electro Refractories & Abrasives Corp., Buffalo, with headquarters in Milwaukee.

♦ ♦ ♦

Robert Forrest, formerly vice president-works manager, Lakeside Bronze Inc., Buffalo, has been appointed service sales engineer, Samuel Greenfield Co., there.

♦ ♦ ♦

James A. Shaffer Jr. has been advanced to chief engineer, Vulcan Foundry Co., Oakland, Calif.

HARRY E. LADWIG

ANTHONY LEBESCH

Harry E. Ladwig recently was appointed foundry consultant of the West Allis foundries and pattern shops, Allis-Chalmers Mfg. Co., Milwaukee. Anthony Lebesch has succeeded him there as works manager, as reported in February

for heavy duty work...choose a

HERMAN

JOLT MACHINE

HERMAN PNEUMATIC MACHINE CO., UNION BANK BUILDING, PITTSBURGH 22, PA.

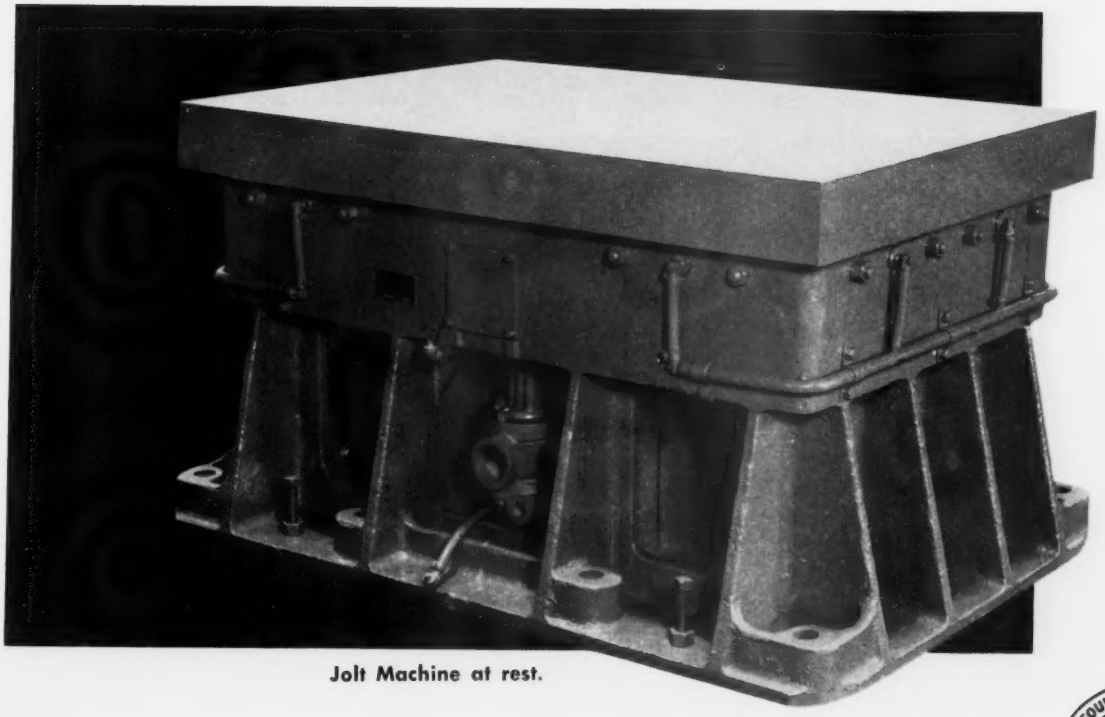
The Herman Jolt Machine illustrated here is ideally suited for heavy duty requirements in a wide capacity range.

It's designed to strike over the entire surface of the machine base to permit ramming a harder mold without damage . . . to allow the handling of capacities from 615 to 140,000 lbs. . . . and to reduce maintenance and production costs.

All Herman Jolt Machines have cast steel table plates and plungers. Wearing plates at the corners of the machine base maintain constant alignment and minimize wear at the cylinder and plunger. Every unit has the Herman "bunter control" operating valve which proportions the amount of air to the load on the machine.

The Herman Jolt Machine is another in the complete line of Herman molding machines, in all types and sizes, to fit every foundry operation. Write today for our catalog No. GC-11-53, or call the Herman sales engineer in your area.

Jolt Machine with table plate and plungers removed for examination.



Jolt Machine at rest.

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

HERMAN

Best Known Name in Molding Machines

BRONZE PLAQUE

Memorializes Sub Capture

FOUNDRY craftsmen at Bronze Inc., Chicago, who manufactured 80,000 castings for the Navy during World War II, recently turned their skills to the production of a bronze plaque memorializing the capture of a Nazi submarine, the U-505. A gift of Bronze Inc., the plaque has been placed in the Science Museum, Chicago, where the submarine now is on permanent display. Sculptor was Fred M. Torrey, Chicago.

The U-boat was captured 100 miles off the coast of French West Africa on June 4, 1944 by a task force commanded by Rear Adm. Daniel V. Gallery of Chicago. Disabled by depth charges, it rose to the surface and was taken captive with small

Virgilio Sbigoli is an old-time "chaser" who works, as shown above, to bring out in metal all phases of the sculptor's work and refine detail

During the crucial pouring period, two crews synchronized operations from opposite sides of the mold in order to insure even flow of metal

TOUGH!

Tough—that's Malleabrasive Shot and Grit! Tough because it's scientifically heat-treated and laboratory controlled for consistency and strength . . . to clean better and faster, last longer. And because it does a better job quicker with less replacements, Malleabrasive cleans *cheaper!*

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U. S. Patent #2184926 (other patents pending)

William Carlson, pattern shop superintendent, composed and set up lettering on sculptor's plaster model before the casting itself was made in bronze

arms and machine gun fire. Scuttling valves had been opened, but were located and closed. It was the only German submarine ever boarded and captured at sea. The German naval code was found in the ship, enabling the U. S. forces to intercept and decode German naval messages thereafter.

The submarine was towed to Portsmouth, N. H. Several months ago it was towed to Chicago from Portsmouth, via the Atlantic Ocean, the St. Lawrence River and the Great Lakes, a trip of more than 3000 miles. At Chicago the vessel was lifted from Lake Michigan and transported to the grounds of the nearby Museum of Science and Industry where it is open to visitors.

Bronze Inc. specializes in sculptural castings. Its staff includes a group of craftsmen skilled in the art of producing statues, tablets, memorials, etc. According to Leonard H. Grosse, president, the U-505 plaque represents the appreciation of his workmen for the war manufacturing entrusted to them. Five months after war was declared the foundry was casting propellers for landing craft and assault boats, as well as torpedo castings and radar pump bases.

Bronze plaque presented this appearance upon its completion

Crowds attracted to the museum by the exhibit have been the largest in its history. About 130,000 persons had attended by Feb. 1.

Steel Founders Meet in Chicago Mar. 14 and 15

Steel Founders' Society of America holds its 53rd annual meeting at the Drake Hotel, Chicago, on Mar. 14 and 15. The meeting opens at 10 a.m. Monday, Mar. 14 with President A. J. McDonald's report, "The Year of Appraisal." C. W. Briggs, technical and research director, will detail the society's research program in a talk, "Horizons in Steel Casting Research," and G. K. Dreher, secretary, will analyze Product Development Contest entries in "Useful Facts from the Product Development Contest." Awards to winners of the contest will be made at the Tuesday noon luncheon.

At the Monday noon luncheon, President McDonald will award the Lorenz Memorial Medal, an annual award made in recognition of outstanding contributions to the steel casting industry. R. C. Wood, chairman of the Technical & Operating committee, will award prizes for the best *Steel Foundry Facts* articles published during the year, and Earle Layman, National Safety Committee chairman will report outstanding safety records and events.

Monday afternoon will be devoted to managerial problems. Title of a talk by Chauncey Belknap, Society counsel, is "Why and Why Not." Dr. Elliott P. Janney of Roher, Hibler & Replogle, Cleveland, will speak on "The First Step in Developing Managerial Talent." E. J. Walsh, executive director of the Foundry Educational Foundation, will discuss "A Talent Source."

Market Subjects will feature the Tuesday morning session. Dean Clement Freund, College of Engineering, University of Detroit, will cover "The Engineering Future." The editor of *Machine Design*, Colin Carmichael, will address the society on "The Design Dilemma." Bernard M. Ames, general manager, Doran Manganese Bronze Corp., Brooklyn, N. Y., will cover "Factors in the Shell Mold Market."

The national product development committee meets Saturday, Mar. 12; the board of directors on Sunday, Mar. 13; and the advertising, public relations and education committee on Tues. Mar. 15. A past president's dinner is scheduled for Sunday evening, Mar. 13, before the opening session.

Worthington Corp. Harrison, N. J. has moved its Detroit office from 2824 East Grand Blvd. to 13305 Puritan Ave. The move nearly doubles its office space.

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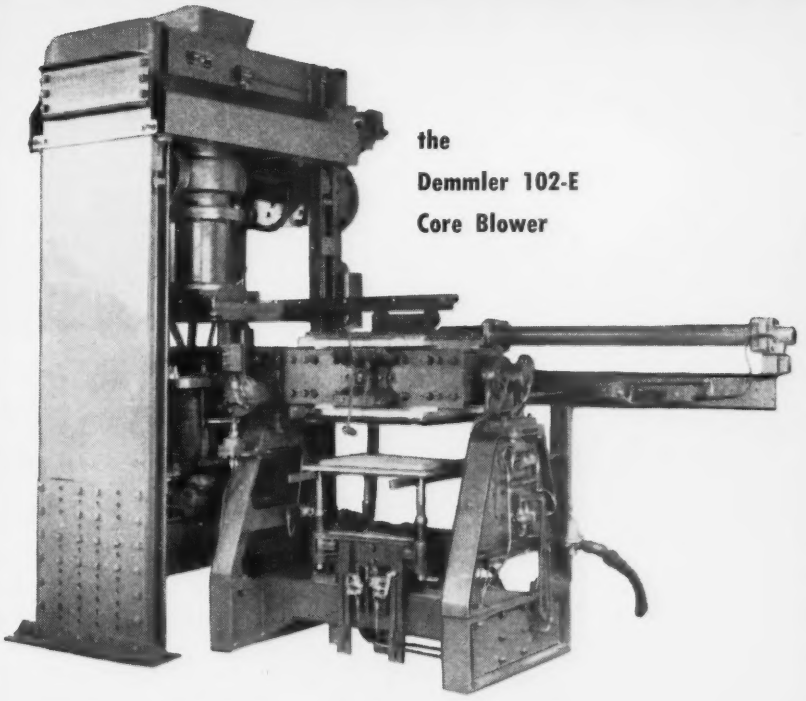

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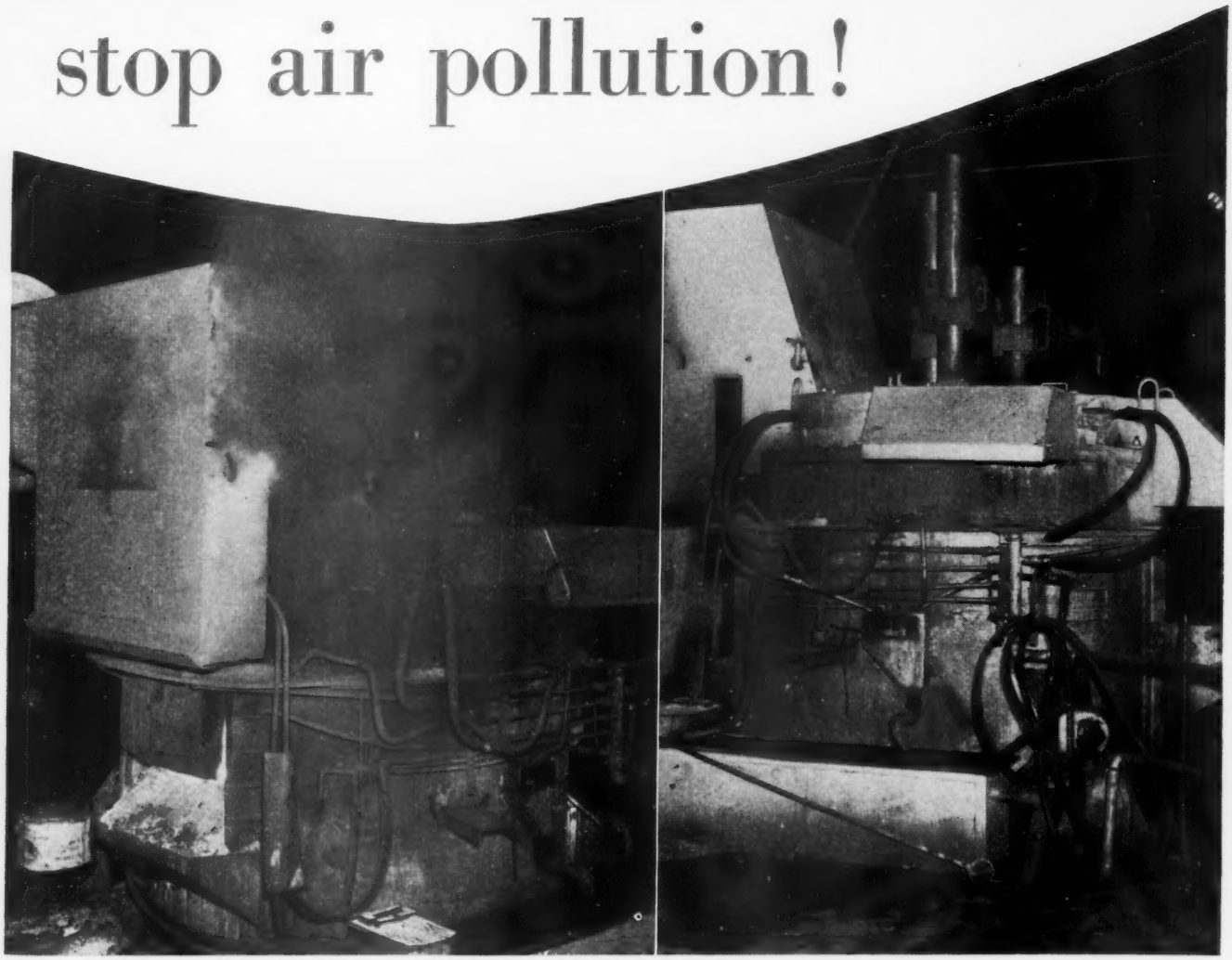

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MALLEABLE FOUNDERS' SOCIETY MEETS

Reports Better Business This Quarter

By WILLIAM G. GUDE
Managing Editor

PRODUCTION of malleable iron castings will show a definite upturn this quarter compared with the fourth quarter of 1954. This was indicated by producers who attended the semiannual meeting of the Malleable Founders' Society at Cleveland, Jan. 21.

Only a little more than 10 per cent of the foundries represented expect operations to be unchanged or down during the opening quarter this year. One-fourth of the plants look for increases ranging from 20 per cent upward. At present nearly one-half of the foundries are operating between 85 and 100 per cent of capacity.

Automotive demand is the leading factor behind the current spurt in operations. Builders of farm implements and tractors show some signs of better activity, while railroads, although still offering a poor market for castings, offer some hope that their needs will expand in coming months.

A high light of the society meeting, presided over by President Charles E. Brust, president, Eastern Malleable Iron Co., Naugatuck, Conn., was the announcement of winners in the second safety letter competition. Theme of the contest was "Accident Prevention." Awards were made by T. T. Lloyd, vice president, Albion Malleable Iron Co., Albion, Mich., and member of the Personnel and Plant Operations Committee. He announced the following winners:

First prize, $100, to James L. Turpin, National Malleable & Steel Castings Co., Indianapolis; second prize, $75, to Nathan Safren, Acme Steel & Malleable Iron Works, Buffalo; third prize, $50, to Lawrence Kaelin, National Malleable & Steel Castings Co., Indianapolis; fourth prize, $25, to William B. Sobers, Chain Belt Co., Milwaukee.

Mr. Lloyd reported a 25 per cent reduction in accident frequency at society members' plants last year. The estimated frequency rate of 16.5 for 1954 compares with 21.6 in 1953 and is a decline of nearly 50 per cent from the 1950 frequency of 31.3. Five foundries had no lost-time accidents in 1954; in 1953 there was only one.

Major part of the meeting program was devoted to committee reports. L. E. Young, Superior Steel & Malleable Castings Co., Benton Harbor, Mich., discussed the society's advertising program. Lowell D. Ryan, managing director, in reporting for the Personnel and Plant Operations Committee, said that the improvement in the industry's safety record reflects the increased number of companies which have become active in accident prevention work. He also touched on the committee's plans for a series of regional conferences; these will cover the general subject of human relations and are intended to promote leadership among plant supervisors.

S. E. Kelley, Eberhard Mfg. Division, Eastern Malleable Iron Co., Cleveland, described work being done by a committee that is studying the subject of welding malleable iron without impairment of its properties. Results of tests now being conducted are expected to be available within a few weeks.

Other committee reports included that of the Cost Committee by W. H. Caldwell, secretary-treasurer, Northern Malleable Iron Co., St. Paul, and the Market Development Committee by Charles M. Brennan Jr., president, New Haven Malleable Iron Co., New Haven, Conn. The latter referred to the Market Development Conference scheduled for Chicago, Apr. 7-8, and to revisions now under way in the society's handbook. The revised handbook is expected to be completed in about two years, it was stated by H. E. Steinhoff, vice president, Wagner Malleable Iron Co., Decatur, Ill., in reporting for the Handbook Committee.

A new series of shop practice meetings will emphasize cost reductions through improved practices, according to George J. Behrendt, vice president, Eastern Malleable Iron Co., speaking for the Research and Product Improvement Committee. He also discussed the committee's research work on gating and feeding. Reporting also for the Technical Council, Mr. Behrendt said that its chief activities have been in connection with the handbook and gating and feeding research work.

James H. Lansing, technical and research director, elaborated further on the society's gating and feeding studies and cited instances where improved yield in castings had been obtained by reduction in feeder volume.

Winners of the second Malleable Founders' Society safety letter contest are presented checks by T. T. Lloyd, vice president, Albion Malleable Iron Co., Albion, Mich., and member of the Personnel and Plant Operations Committee. Left to right are Nathan Safren, Acme Steel & Malleable Iron Works, Buffalo, second prize winner; Mr. Lloyd; James L. Turpin, National Malleable & Steel Castings Co., Indianapolis, first prize winner; and Lawrence Kaelin, National Malleable & Steel Castings Co., Indianapolis, third prize winner. The fourth prize winner was William B. Sobers, Chain Belt Co., Milwaukee, who was absent

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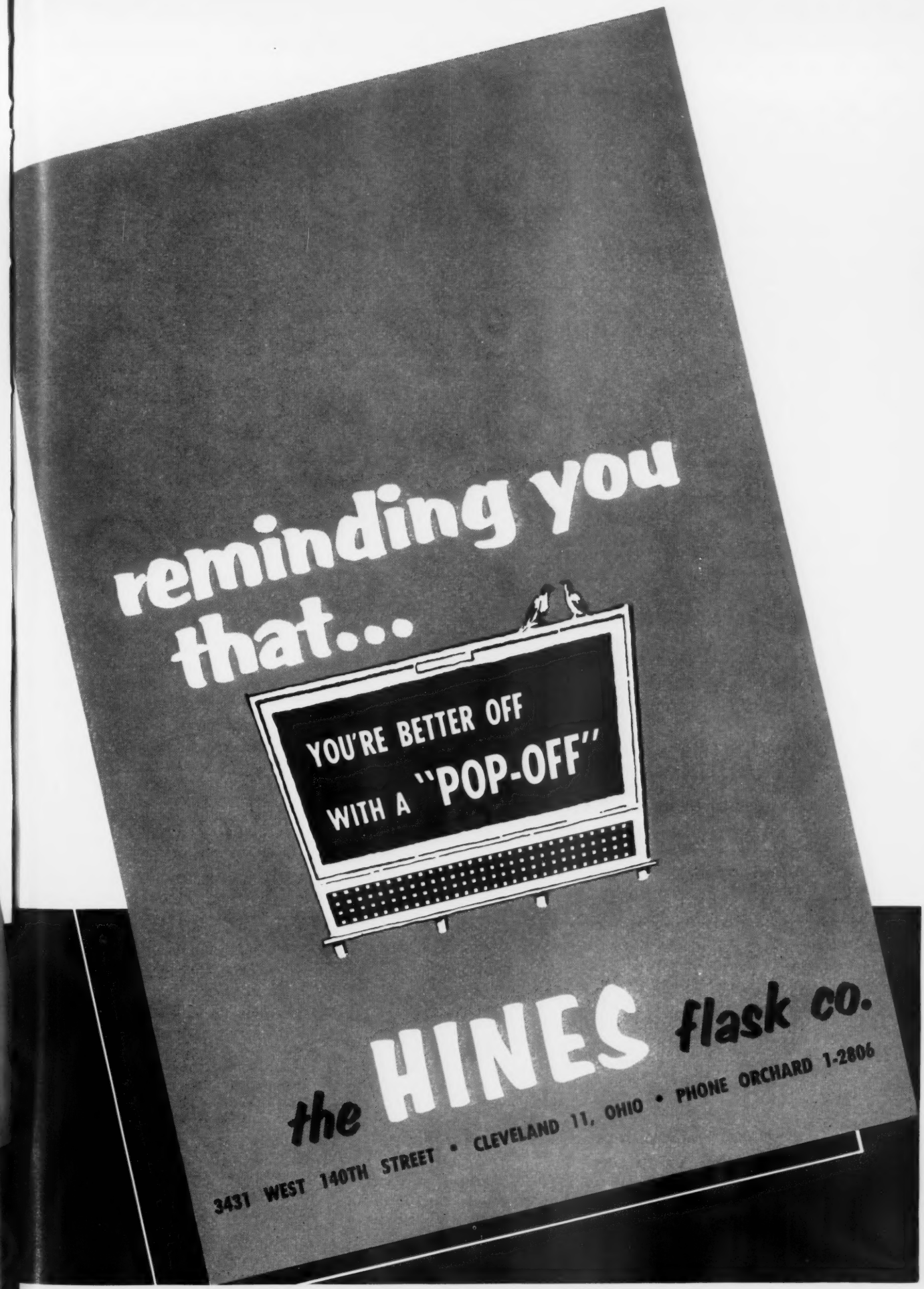
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INDUSTRY BRIEFS

STERLING ALUMINUM PRODUCTS INC., 2925 North Market St., St. Louis, will move its entire operations to St. Charles, Mo. A 250,000-sq-ft plant costing an estimated $3 million is scheduled for completion by the end of 1955. The firm, manufacturer of pistons and piston rings, stated that a need for more space has caused the move.

Dewey Pattern Co., Toledo, O., has moved to a newer and larger plant at 2512 Albion St., from 3120 Monroe where it had produced foundry patterns since 1929. The new location was purchased to provide added space and modern facilities required for expanded operations. A completely equipped metal shop has been added to the company's facilities.

Rampe Mfg. Co., 3320 St. Clair Ave., Cleveland 14, O., has incorporated after operating eight years as a partnership. Officers are John F. Rampe, president and treasurer; W. Charles Rampe, vice president; and Paul A. Rampe, secretary. The firm manufactures a line of tumbling and screening machines.

Alcaloy Inc., 251 Third St., Trenton, N. J., manufacturer of brass and bronze permanent mold castings and producer of an alloy of aluminum and copper, has purchased land and buildings from Republic Steel Co. for future expansion.

Ironton Fire Brick Co., Ironton, O., has appointed Charles E. Mainprice, 600 Sixteenth St., Oakland, Calif., its representative for California.

Carborundum Co., Niagara Falls, N. Y., has established a new operating unit, the Electro Minerals Division, to manufacture and sell silicon carbide and fused alumina crudes, abrasive grain and related electric furnace products. Joseph S. Imirie is general manager of the new division. The Bonded Products and Grain Division, which formerly included the field now given to the Electro Minerals Division, is now known as the Bonded Abrasives division. This division specializes in the manufacture and sale of grinding wheels, sharpening stones and other bonded abrasives.

Dayton Malleable Iron Co., Dayton, O., has purchased all of the stock of the Meta-Mold Aluminum Co. and its subsidiary the Metal Mold Magnesium Co., both located in Cedarburg, Wis. Anthony Haswell, president of Dayton Malleable, has become Meta-Mold's board chairman. P. J. Watry continues as president of Meta-Mold.

Gray-Syracuse Inc., 107 North Franklin St., Syracuse 4, N. Y., has bought a plant of S. Cheney & Sons, Manlius, N. Y., for expansion purposes. The plant will provide 30,000 sq ft of space for the company's precision investment casting operations. Cheney had previously consolidated its operations in a gray iron foundry in Manlius.

Eclipse Fuel Engineering Co., Rockford, Ill., has purchased the Mettler Co., 4366 Worth St., Los Angeles 63. Mettler will operate as a division of Eclipse, producing gas and combination fuel burners.

Gardner-Denver Co., Quincy, Ill., and the Keller Tool Co., Grand Haven, Mich., have consolidated. Keller Tool Co. has become the Keller Tool Division of Gardner-Denver Co. and will continue its operations under the former Keller management. E. V. Erickson, Keller president, is an executive vice president of Gardner-Denver; Gifford V. Leece remains as president of Gardner-Denver Co.

Mercast Corp., 295 Madison Ave., New York 17, N. Y., has purchased the stock interest held by National Bronze & Aluminum Foundry Co., Cleveland, in Alloy Precision Castings Co., Cleveland, one of Mercast licensees. Management of Alloy Precision will remain the same; however, membership of the board of directors will be adjusted.

American Chain & Cable Co., Bridgeport, Conn., has purchased Allison Co. of Bridgeport, manufacturer of abrasive cutting wheels. For years Allison Co. has worked closely with the Campbell Machine Division of American Chain & Cable, which makes abrasive cutting machines. Hugh V. Allison continues as president of Allison.

Alvey-Ferguson Co., 75 Disney St., Cincinnati 9, has acquired the Cincinnati Automatic Conveyor Co. and the manufacture of its lightweight overhead conveyors. James A. Gailey, former owner of Cincinnati Automatic Conveyor Co., has joined the Alvey-Ferguson sales and engineering staff.

Minnesota Mining & Mfg. Co., St. Paul, recently put into operation a huge sandpaper-making machine. A 976-ft-long plant was built to house the machine engineered to make the coated abrasives needed in industrial grinding and finishing.

Kaiser Aluminum & Chemical Sales Inc., has opened a new branch sales office at Suite 480, Denver Club Bldg., 518 Seventeenth St., Denver. W. B. Lake, branch representative, handles pig, alloy ingot and other aluminum products.

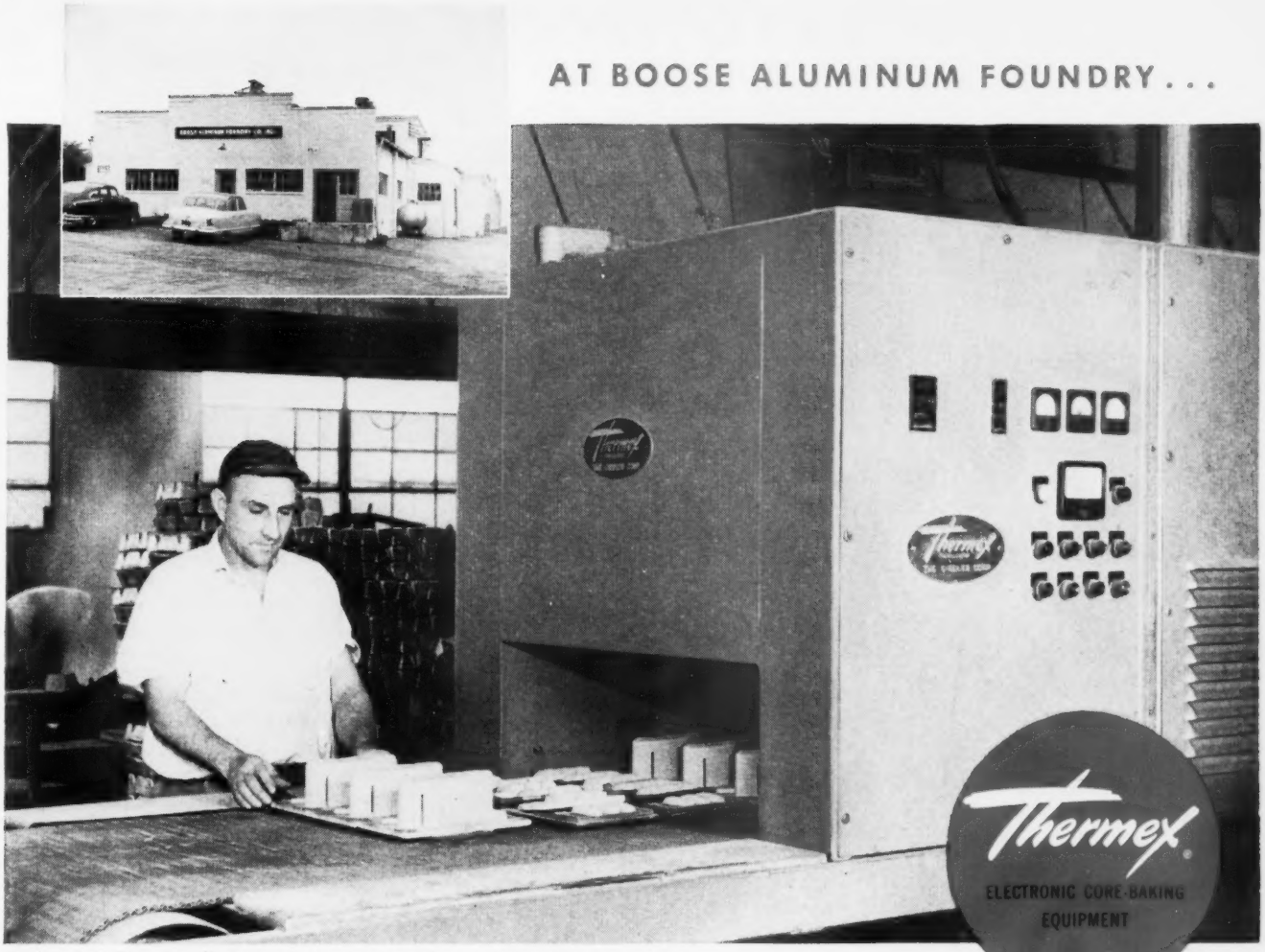
Beryllium Corp., Reading, Pa., has opened a sales office at 1915 South Shepard, Houston, Tex. Ross E. Schofield, district representative in charge, will provide sales engineering services to users of beryllium alloys in Texas and Louisiana.

Ludlow Valve Mfg. Co., Troy, N. Y., has purchased the Rensselaer Valve Co., Cohoes, N. Y. Ludlow will continue to manufacture the complete line of Rensselaer products.

South Chester Tube Co., Chester, Pa., has purchased the Dodge Steel Co., 6501 Tacony St., Philadelphia

COMBINES OFFICES IN NEW BUILDING: Union Carbide & Carbon Corp. of New York has consolidated its Cleveland offices at 1300 Lakeside Ave. All divisions of Union Carbide located in the Cleveland area, Bakelite Co., Carbide & Carbon Chemicals Co., Electro Metallurgical Co., Haynes Stellite Co., Linde Air Products Co. and National Carbon Co., are housed in the new headquarters building

AT BOOSE ALUMINUM FOUNDRY . . .



Dielectric baking installation at Boose consists of two 15 KW THERMEX Core Baking Units in tandem. Cores vary from ½ ounce to more than 20 pounds.

Better cores...Lower costs...Cleaner Conditions

This progressive foundry at Reamstown, Pa., reports these benefits from dielectric baking with THERMEX* Core Baking Equipment:

BETTER CORES. Uniform heat throughout core eliminates over-baking and distortion. Result: smoother, more accurate castings.

LOWER COSTS. Continuous, high-speed baking boosts output per manhour 33%. Saves production and storage space. Cuts handling.

IMPROVED WORKING CONDITIONS. Operation is smokeless. Unit does not give off external heat. Simple, push-button control.

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Engineering Offices or Sales Agencies in Principal American and Canadian Cities

35. Dodge Steel, manufacturer of electric furnace steel castings, will be operated as a separate and wholly owned subsidiary.

Holcroft & Co., 6545 Epworth, Detroit 10, manufacturers of heat treating furnaces and equipment, has appointed William K. Duff & Co., 410 West Ave., Darien, Conn., its sales representative for Connecticut, Massachusetts and Rhode Island.

Jervis B. Webb International Co., Detroit, has licensed Bishops Implements Pty. Ltd., Melbourne, Australia, to manufacture and install Webb designed and engineered conveyors in the Commonwealth of Australia and mandated territories.

Joseph C. Fox has opened an office at 4401 Jackman Rd., Toledo 12, O., for consultation on chemical and metallurgical phases of the die casting process. Mr. Fox was formerly chief metallurgist with the Doehler-Jarvis Corp.

Grayson Controls Division, Robertshaw-Fulton Controls Co., formerly at 3000 East Imperial Highway, Lynwood, Calif., has moved to a new factory on Long Beach Blvd., at Long Beach Freeway, Long Beach 5, Calif.

Jeffrey Mfg. Co., Columbus, O., has opened a western territory sales headquarters with Stanley M. Mercier as manager. Offices are in the Flood Bldg., 870 Market St., San Francisco.

Reliance Electric & Engineering Co., 1088 Ivanhoe Rd., Cleveland 10, has acquired the Reeves Pulley Co., Columbus, Ind. Management at Reeves will remain intact and it will continue as a separate division.

York Barbell Co., York, Pa., suffered a $500,000 loss in the destruction of its foundry at Marietta, Pa., by fire. The blaze started when sparks from a welding torch set fire to a vat of paint.

Ajax Flexible Coupling Co., Westfield, N. Y., manufacturer of couplings and vibrating conveyors has appointed Howard S. Gans, 608 Transportation Bldg., Cincinnati, sales representative.

Milwaukee Metal Briquetting Co., 138 East Madison St., Milwaukee, a subsidiary of Grossman Bros. Co., has started metal briquetting on a jobbing basis for foundries in the area.

Reynolds Metals Co., 2500 South Third St., Louisville, has appointed Milward Alloys Inc., Lockport, N. Y., a distributor of aluminum pig and ingot.

Quantity and Quality are *Guaranteed* when you specify Neville Foundry Coke

As a merchant producer of Neville Foundry Coke, Pittsburgh Coke & Chemical now has four batteries of ovens to serve you. That's your guarantee of reliable, continuing supplies when you specify Neville.

What's more, we guarantee the *quality* of our coke, too. For Neville Foundry Coke is made from clean, washed coals containing a high percentage of Pocahontas and carefully processed to produce stronger, denser, more uniform coke with more fixed carbon and less ash and sulphur. As a result, Neville Foundry Coke provides maximum temperature at the nose of the tuyere to give you hotter, cleaner, more fluid iron.

Let us fill *your* requirements today—with *guaranteed* Neville Foundry Coke, sized to your specifications.

Specifications of Neville Foundry Coke

Volatile Matter	Fixed Carbon	Ash	Sulphur
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Standard ASTM Shatter on 2" screen is 95%. Porosity controlled at 48%.

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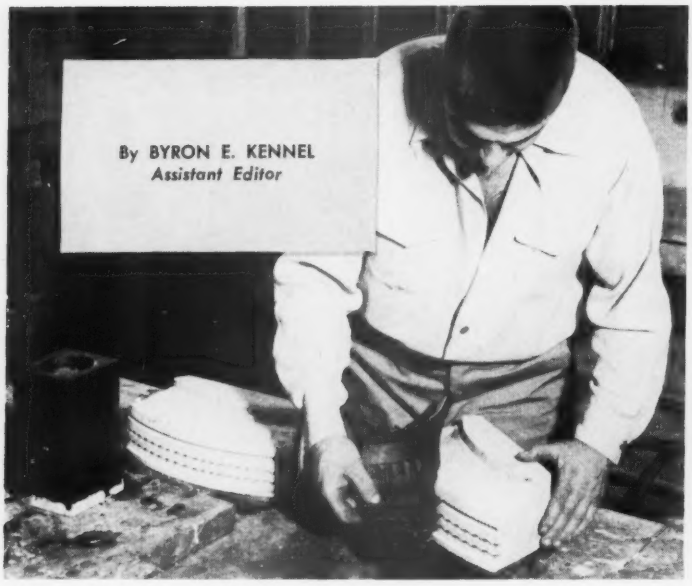


By BYRON E. KENNEL
Assistant Editor

Fig. 1—Flexible rubber pattern peels off plaster core, leaving precision imprint in plaster

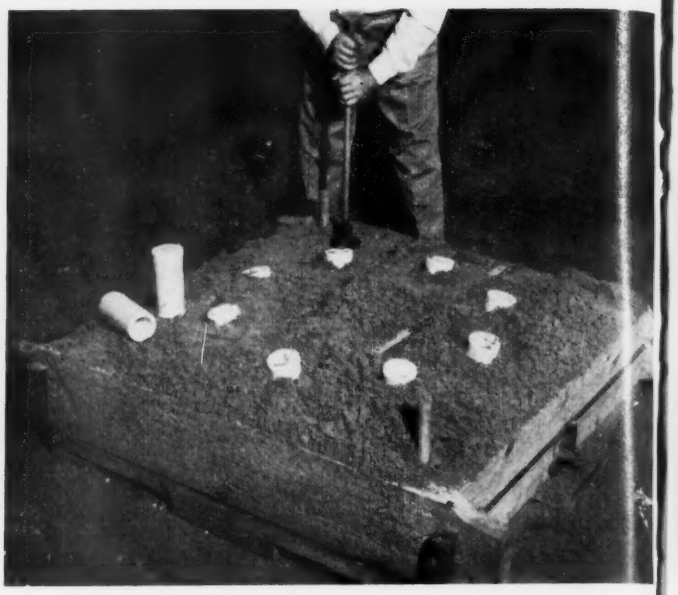


Fig. 3—Plaster risers are rammed up in cope. Plaster insulation makes small risers possible

Fig. 2—Examples of daily production include a housing and a gear guard

Small Foundry Makes Large Castings

LARGE castings can be made in small foundries. All that is necessary, says Walter O. Larson Jr., president and owner of the Grafton Foundry Co., Grafton, O., is proper equipment and know-how based on experience.

The Grafton foundry started operations in July, 1951, in a building 36 x 54 ft. In December, 1953, operations were moved into a new building constructed of steel girders and aluminum siding. This 50 x 100 ft building, layout of which is shown in Fig. 7, provides better facilities and room for future expansion. The front of the building, 20 x 50 ft, is used for office space and storage; the rest, 50 x 80 ft, is used for all foundry operations.

The largest aluminum casting poured so far in the new foundry weighed 300 lb, but the ability to handle flasks 80 x 80 in. and to melt 1000 lb of aluminum per hour means that even larger castings can be made in the future.

Typical of the smaller castings produced in the course of a day's operations are shown in Fig. 2. Castings pictured include a blower housing and a gear guard. Many castings produced are larger than those pictured. Molding operations for one of these large castings are shown in Fig. 4.

All foundry operations are performed by four men. Both brass and aluminum are poured. Most of the castings are made in green sand, but plaster molding forms an important part of the operations. Fig. 1 shows a flexible rubber pattern being removed from a plaster core segment used in making tire molds. The combination of flexible patterns and plaster makes possible the production of undercuts on the mold with high accuracy and without the use of additional cores. A high-speed mixer is used to prepare the plaster mixture, which is composed of ten parts plaster to eight parts water.

Plaster molds are dried at 180° F in a gas fired oven for varying times depending on size of molds. Cores shown being rammed up in a cope in Fig. 3 are also made of plaster. They form the risers of the green sand mold. These cores, made in the rubber corebox shown at the left of Fig. 1, are cylindrical and have walls ½-in. thick. The tops are closed except for a small vent hole provided for the escape of the air in the mold cavity when the casting is poured. The high heat insulating properties of the plaster keep the metal liquid in the risers until the casting has set. The size of the risers is greatly reduced by this method because the plaster holds in the heat while the green sand mold allows it to escape.

Two pneumatic jolt-squeeze ma-

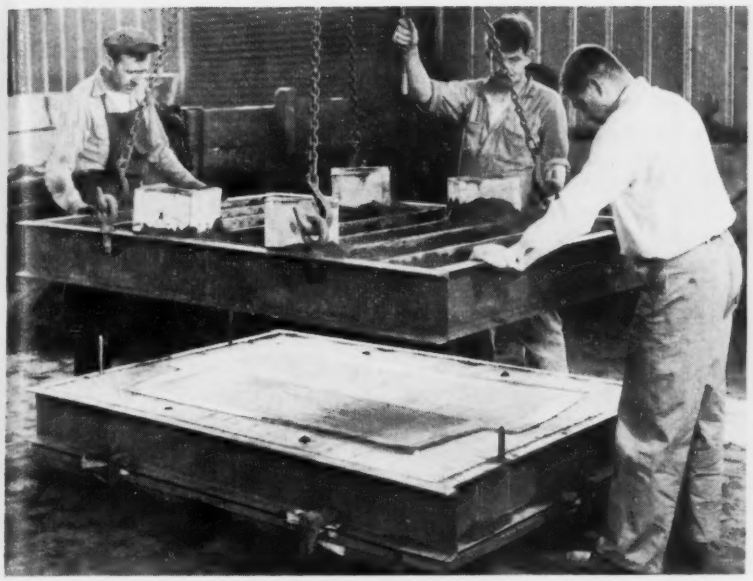


Fig. 4—Turnbuckles start drawing the cope from the pattern. Electric hoist finishes the draw

Fig. 5—Thermocouple readings are made of each crucible of molten metal before it is poured

Fig. 6—Backing sand is aerated by portable electric sand conditioner

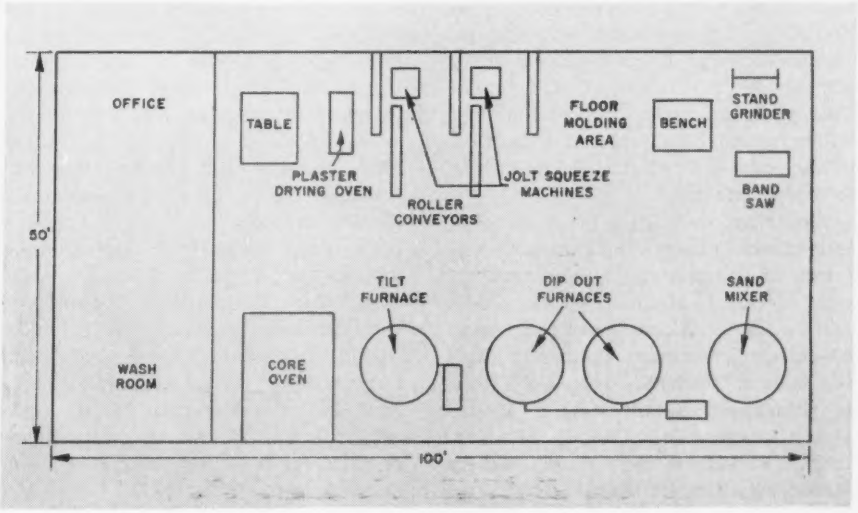


Fig. 7—Plant layout features crane facilities over entire shop area. Building is made with cement flooring, steel girders, aluminum siding

chines comprise an important part of the molding area. The machines handle matchplates used in the production of smaller castings. Snap flasks are used. The squeezer floors are identical. At the left of each molding machine is a molder's bench; to the right is the sand pile and in the rear an 8-ft section of conveyor rolls is used for setting the molds while they are closed up.

Large molds are made on the floor adjacent to the machine molding operations. Fig. 4 shows a cope being removed after ramming. Production of large molds is made possible by the crane facilities of the shop. A 1½-ton electric hoist is used on a crane which spans the entire foundry area. Heavier jobs can be han-

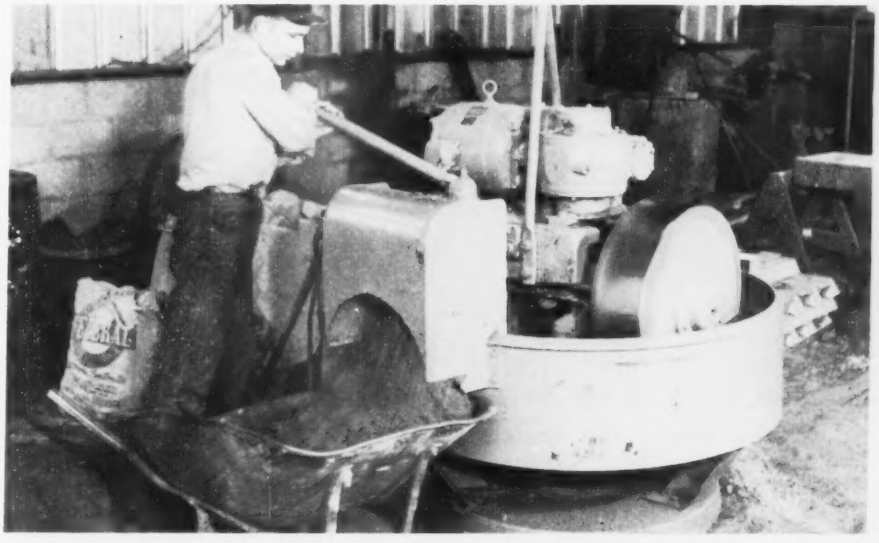


Fig. 8—A 4-cu-ft capacity sand mulling machine prepares the sand in 200-lb batches. Base of facing sand is a washed McConnellsville sand

dled by a crane of 5-ton capacity which covers a bay 25 x 80 ft. The four pouring basins shown in Fig. 4 are required because of the thin sections and large size of the particular casting to be poured. Turnbuckles are used to start the draw of the cope from the pattern. Easy parting is provided by aluminum powder, which is dusted on the pattern. All castings are poured on the floor.

The cleaning department is located next to a large door provided for truck pickups and deliveries. A large two-wheel stand grinder and a band saw are used in gate removal and finishing. A bench equipped with vises and pneumatic hand grinders and a portable sand blasting unit complete the cleaning facilities.

Melting equipment consists of three oil-fired furnaces. Two are dip out furnaces, each with a capacity of 500 lb of aluminum. A centrifugal blower supplies air for these two furnaces. The third furnace—tilting type—has a capacity of 225 lb of aluminum. Thermocouple readings are made before pouring, as shown in the view of the melting department, Fig. 5. The range of aluminum pouring temperatures is from 1200 to 1300° F.

Metals poured include brass and bronze alloys such as 85-5-5-5, 80-10-10, manganese bronze, magnesium alloys and aluminum alloys such as Alcoa 43, 108, 319, 355 and 356. Tern-alloys are used for pouring castings with high-tensile requirements. Only ingots are used in melting.

Degassing is accomplished by using either chlorine pills or nitrogen gas. When chlorine pills are used, one pill is added for each 200 lb of

FEF CONFERENCE WILL EMPHASIZE SALES AND MARKETS

Industry and School Leaders To Meet in Cleveland

CONSIDERATION of a different approach to engineering education will mark the 8th annual College-Industry Conference of the Foundry Educational Foundation, Wednesday and Thursday, Mar. 9-10, at the Hotel Cleveland, Cleveland. This year discussion at the meeting will emphasize the role of education in the sales and market areas of the foundry industry.

Thursday morning, a panel will talk about "Sales and Market Aspects of Engineering Education in Cast Metals." Members of the panel will be M. J. Allen, American Steel Foundries, chairman; Collins L. Carter, Albion Malleable Iron Co.; Ross L. Gilmore, Superior Steel & Malleable Castings Co.; Charles H. Ker, Dalton Foundries Inc.; R. B. Parker, American Brake Shoe Co.; and Stowell Wasson, National Malleable & Steel Castings Co.

The first day of the two-day program will be devoted largely to descriptions by faculty members of the latest developments in course material, laboratories and instructional techniques. This session will be followed by the annual meeting of the FEF, and the high point of the conference, the banquet, is scheduled for the evening.

Featured speaker at the banquet will be Dr. T. Keith Glennan, president, Case Institute of Technology. Dr. Glennan is former director of the U. S. Navy Underwater Sound Laboratory, New London, Conn.; winner of the Medal of Merit, highest U. S. civilian award; and a former member of the Atomic Energy Commission.

FEF IN CALIFORNIA: Top management in the foundry industry of northern California met Jan. 14 in Oakland, Calif., to hear a discussion of possibilities of establishing a Foundry Educational Foundation school on the West Coast. E. J. Walsh, FEF executive director, spoke to the group. Shown here, left to right, are: John Bermingham, E. F. Houghton Co., chairman, Northern California Chapter, AFS; James Campbell, foundry instructor, University of California; Mr. Walsh, and E. F. Marquardson, vice president of the Pacific Steel Castings Co.

The complete program follows:

Wednesday, Mar. 9

8:30 a.m.—Registration.

9 a.m.—Meetings: Board of Trustees, 1954-55; Industry Advisory Committee Chairmen; University Advisory Committee; Technical Advisory Committee.

10:30 a.m.—Address of Welcome: Thomas Kaveny Jr., Herman Pneumatic Machine Co., Pittsburgh, and president, Foundry Educational Foundation. Keynote Address: "Molding Your Future," J. H. Smith, Central Foundry Division, General Motors Corp., Saginaw, Mich.

11:15 a.m.—University Activity: Purdue University—"A Classroom Presentation of an Industrial Process," H. A. Montgomery, Foundry Instructor.

12 noon—Lunch.

1 p.m.—University Activity: Michigan State College—"New Curricula in Metallurgical and Mechanical Engineering at Michigan State College," Dr. A. J. Smith, Metallurgy Department. Ohio State University—"The Foundry Laboratory for Process Control, Time Study and Methods Evaluation," Dr. D. C. Williams, Industrial Engineering Department. Massachusetts Institute of Technology—"Industrial Research as a Tool in Foundry Education," C. M. Adams Jr., assistant professor, Metallurgy Department. Illinois Institute of Technology—"College Training and Industry Needs for Engineers," Dr. L. F. Mondolfo, Metallurgical Engineering Department. Case Institute of Technology—"Future Direction of Foundry Education at Case," J. F. Wallace, associate professor, Metallurgical Engineering Department. Pennsylvania State University—"Statistical Inference as a Basic Discipline in Industrial Engineering Curriculum at Penn State," D. C. Ekey, assistant professor, Industrial Engineering Department.

3 p.m.—Annual Meeting: Foundry Educational Foundation, Thomas Kaveny Jr. presiding.

4 p.m.—Trustees Meeting, 1955-56.

6 p.m—Reception, New Officers.

6:45 p.m.—Banquet: M. J. Allen, American Steel Foundries, presiding. Speaker, Dr. T. Keith Glennon, president, Case Institute of Technology.

Thursday, Mar. 10

9:30 a.m.—Recommendations of Committees.

10 a.m.—Panel: Sales and Market Aspects of Engineering Education in Cast Metals. Chairman—M. J. Allen, American Steel Foundries. Collins Carter, Albion Malleable Iron Co.; R. L. Gilmore, Superior Steel & Malleable Castings Co.; C. H. Ker, Dalton Foundries Inc.; R. B. Parker, American Brake Shoe Co.; Stowell Wasson, National Malleable & Steel Castings Co.

12 noon—Lunch.

1 p.m.—"Properly Engineered Castings," W. G. Ferrell, Auto Specialties Mfg. Co., St. Joseph, Mich.

1:30 p.m.—Comments by former Foundry Educational Foundation Scholarship Holders: A. W. Bardeen, Case '51—Ohio Brass Co., Mansfield, O.; R. H. Dobbins, Michigan State '51—Albion Malleable Iron Co., Albion, Mich.

2 p.m.—"The Future and the Foundry Educational Foundation," E. C. Hoenicke, Eaton Mfg. Co., Vassar, Mich.

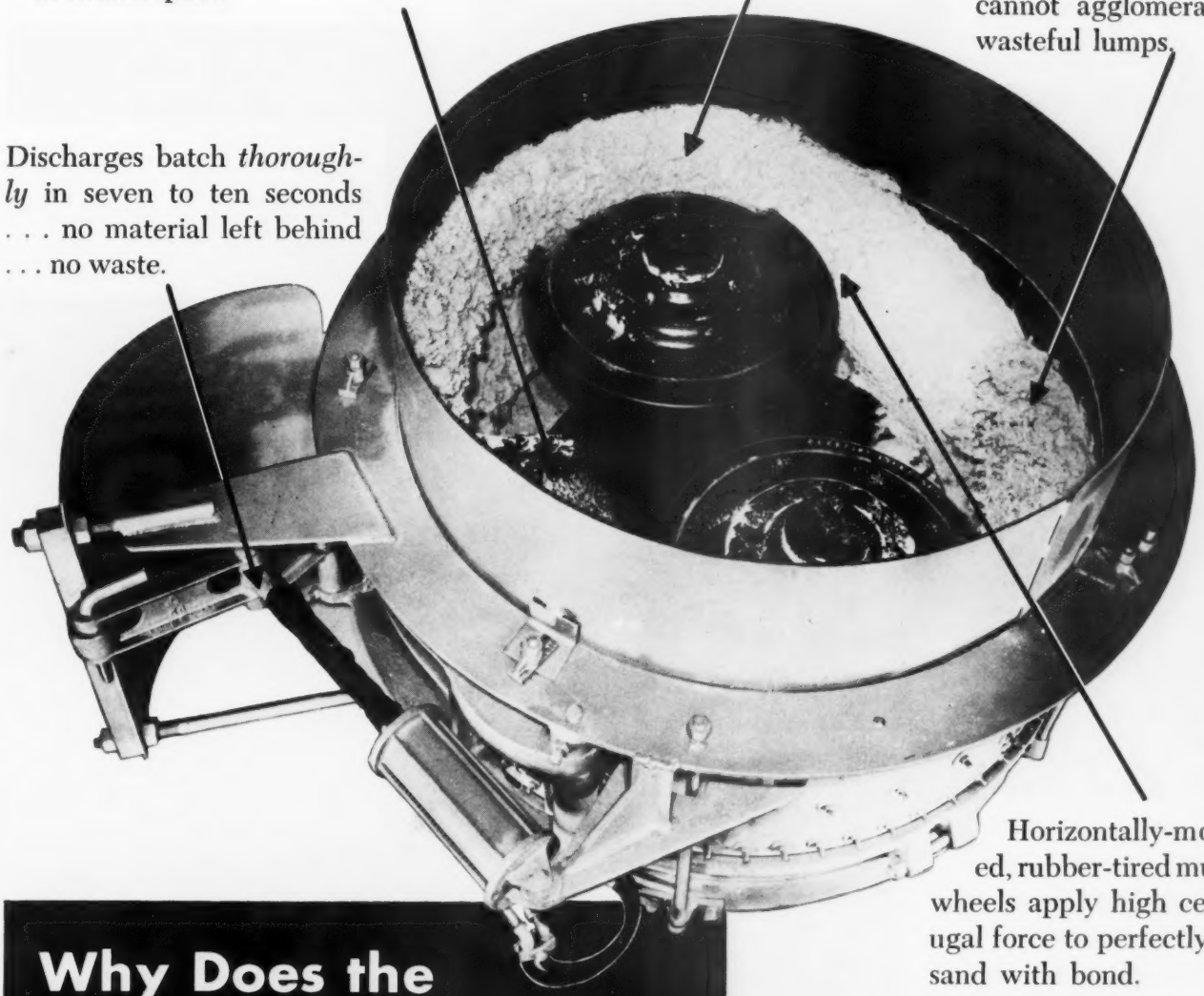
2:30 p.m.—Conference Summary and Recommendations, Prof. E. R. Shorey, Mining and Metallurgy Department, University of Wisconsin, presiding.

Sand mulled between rubber mullor tire and rubber liner . . . rubber distributes bond better than metal by *squeezing* it around grains.

New efficiency—contoured plows keep sand and bonding materials in mullor path.

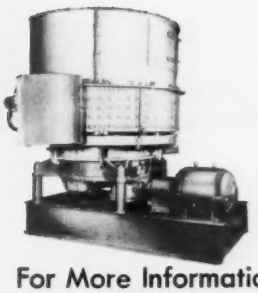
Thorough aeration during mulling . . . bond cannot agglomerate in wasteful lumps.

Discharges batch *thoroughly* in seven to ten seconds . . . no material left behind . . . no waste.



Horizontally-mounted, rubber-tired mulling wheels apply high centrifugal force to perfectly coat sand with bond.

Why Does the SPEEDMULLOR Cut Material Costs One-third to One-half?



When mulling efficiency goes up, the amount of expensive bonding additions needed to obtain specified properties goes down. That's why the Speedmullor's more efficient *rubber-to-rubber* mulling means material savings of one-third to one-half.

Independently conducted tests have proven that the Speedmullor coats sand with bond *more than three times as fast and up to twice as thoroughly* as the old metal-to-metal mixers.

Add to between-rubber mulling, the advantages of aeration during mulling, a fast thorough discharge, and high-pressure centrifugal mullors; and you'll see why the Speedmullor saves one-third to one-half on materials.

For More Information About the **SPEEDMULLOR** Write to

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FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION MEMBER FEMA

SANDSLINGER

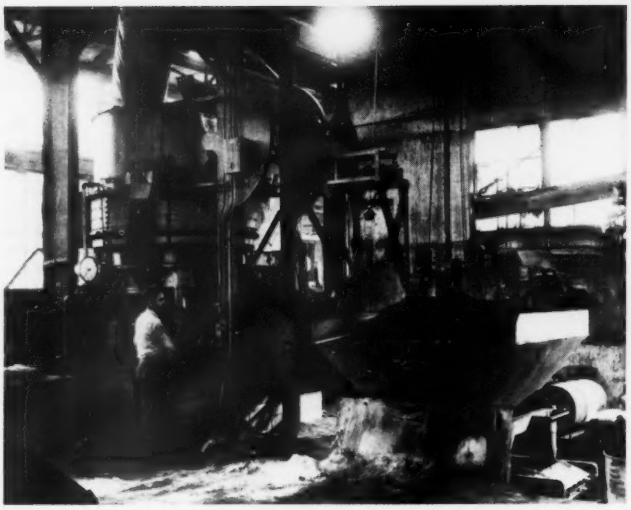
Flask and pit molds are rammed on both sides of the slinger's track.

Cuts Molding Time in Half at ST. MARYS FOUNDRY!

A single Speedmullor-Preparator Unit prepares all molding and core sand

Top quality machine tool castings, weighing up to 12,000 lbs., are produced at the St. Marys Foundry Co., St. Marys, Ohio. To do the job right, this foundry uses a Motive Sandslinger to ram all of the medium and large molds, and a Speedmullor-Preparator Unit to thoroughly condition and mull all molding and core sand.

St. Marys management reports that the slinger cuts molding time in half on their average mold. The Speedmullor-Preparator Unit replaced a smaller Speedmullor that was in operation over eleven years with *no* downtime.



All of the foundry's molding sand is conditioned and mulled during the day. Core sand is prepared in two hours each night.

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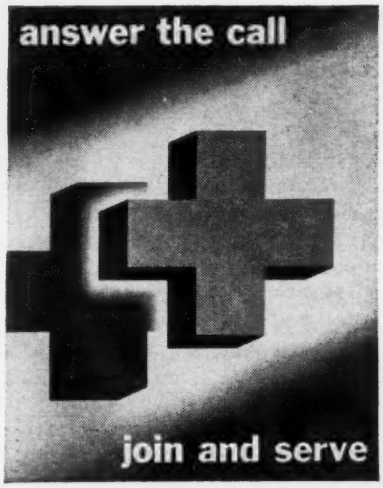
aluminum. The metal is not poured until 30 minutes after the addition of the chlorine. Procedure in using nitrogen gas is to allow the nitrogen to bubble through the metal for 15 minutes. Metal is ready for pouring 15 minutes after the bubbling has stopped.

Cores are made as needed and are baked in a large batch-type oven. This oven, large enough to hold an entire rack of cores, is gas fired.

Synthetic sand is used in the foundry. The base of the facing sand is washed McConnellsville sand of 155 AFS fineness. To 200 lb of this sand is added 2 lb of cereal, 8 lb of southern bentonite and 2 lb of wood flour. Moisture is kept between 4 and 5 per cent. A 4 cu ft capacity sand mulling machine is used to prepare the facing sand. Fig. 8 shows the sand being discharged from the sand muller into a wheelbarrow. Backing sand is made by wetting down the used sand on the floor and shoveling it onto a small sand aerator which discharges it onto a pile as shown in Fig. 6. This unit is portable and may be set where required for the correct placement of the backup sand.



Health Services Are Described In New Government Book

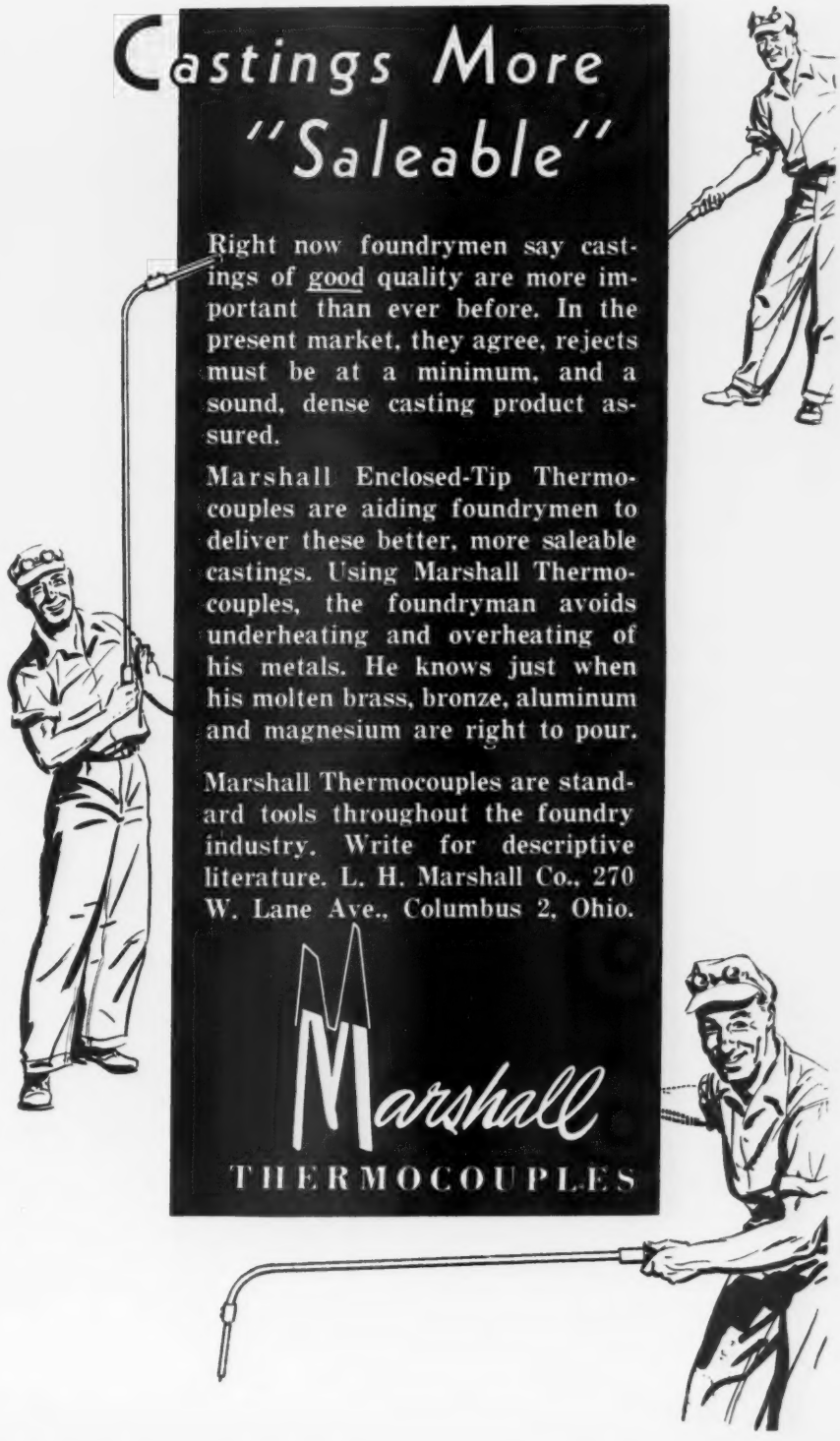
In an effort to help small firms answer the question of how to provide health services for their employees, The Small Business Administration has issued a booklet, "Health Maintenance for Greater Efficiency." Designed to help eliminate losses from illness and accident, the booklet discusses the need for health services, providing the services, estimating the costs and pertinent management problems. The booklet is available from the Superintendent of Documents, Washington 25. Price is 25 cents per copy.

Specifications Are Issued For Nickel Electrodes

Standard requirements for nickel and nickel-base alloy covered welding electrodes are given by tentative specifications — American Welding Society designation A5.11-54T and ASTM designation B 295-54T. A table gives chemical analyses of the different classifications. Copies of the specifications can be obtained at 25 cents each from either the American Welding Society, 38 West 39th St., New York 18, or the American Society for Testing Materials, 1916 Race St., Philadelphia 3.

Employees Win Safety Award At Rem-Cru Titanium

Employees of Rem-Cru Titanium Inc., Midland, Pa., have worked one million man-hours without a lost-time accident. In recognition of this achievement, Liberty Mutual Insurance Co. and the State Department of Labor have presented awards to the firm.


Castings More "Saleable"
Right now foundrymen say castings of good quality are more important than ever before. In the present market, they agree, rejects must be at a minimum, and a sound, dense casting product assured.
Marshall Enclosed-Tip Thermocouples are aiding foundrymen to deliver these better, more saleable castings. Using Marshall Thermocouples, the foundryman avoids underheating and overheating of his metals. He knows just when his molten brass, bronze, aluminum and magnesium are right to pour.
Marshall Thermocouples are standard tools throughout the foundry industry. Write for descriptive literature. L. H. Marshall Co., 270 W. Lane Ave., Columbus 2, Ohio.
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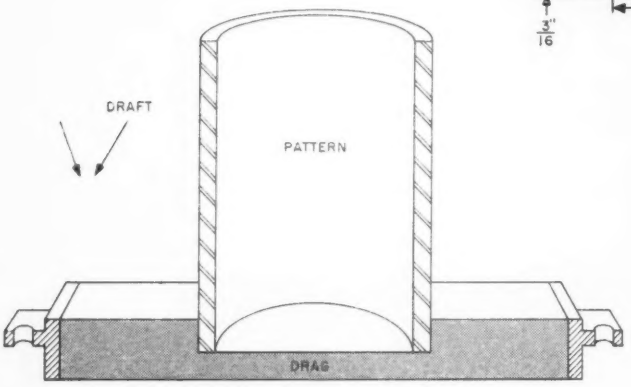

Fig. 1—To make the mold for a heavy bushing, level up a suitable drag on the floor or in a shallow pit

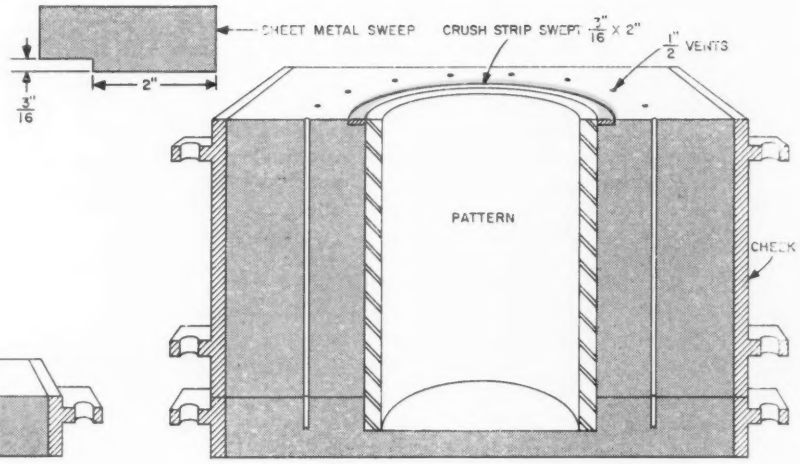

Fig. 2—To ram the cheek, go completely around the pattern, then ram cheek completely to top, as shown

Casting Heavy Bushings

DEAR CHARLIE:

Now and then we get a shot at a somewhat heavier job than usual, and then the trouble starts. We just took on such a job—a bushing 45 in. long, OD 40 in., ID 34 in., to be cast in 78-7-15. The pattern is in one hunk, and we thought it had ample draft. We are putting it on a bottom board, parting down, ramming it up in the conventional manner, rolling it over and ramming up a cope in the usual manner. We have made two unsuccessful attempts to cast this rascal.

On the first try, not only did the sand give out, but the casting cracked up one side. It looked like a hot tear caused by the green sand core's failure to collapse properly. The second time, we put the mold up softer, and it not only swelled, but burned in badly. We attempted to spray and skin dry the mold, but could not do either correctly. We also have lots of trouble getting a clean lift and a clean mold. We are pouring the job through the top and have been told that the fall is too far.

Having had no experience in loam, we need to know what could be used for this kind of work that does not require a lot of experience.

SAM

DEAR SAM:

Boy, I know what you mean about taking on this kind of job. It's hard to resist, but I have seen the time when I had wished I had left them for some one equipped to handle them as a regular diet.

When you get into a job as big and as long as this bushing, it is wise to make the mold in parts. Molding a job this deep in a two-part flask hinders patching, spraying, drying or even inspecting the vertical walls of the cavity. If the pattern is lagged up in segments and then turned, as I suspect this one is, it can be mighty hard to draw from the drag, especially if it is not new. You may nearly have to tear it up to rap it loose, unless it has draft on it like a rubber ball's. It takes considerable experience to ram up a job of this sort to the proper mold hardness, keeping it the same from top to bottom.

How To Make It—Now let's make this bushing, first in skin-dried green sand and then in cement sand. I have seen the following mix used with wide success for brass from 200 lb to 1 ton: 2000 lb of shakeout sand; 500 lb 90-120-mesh silica sand; 2½ to 3 qt western bentonite; 7 qt pitch; 7 qt clay; 1 to 1½ qt cereal; 1 to 1½ per cent 200-mesh hardwood flour; and moisture to temper. The mold is washed and skin dried.

To make the mold, level up a suitable drag on the floor or in a shallow pit. Ram it up level with green sand, strike it off, and place the pattern on the drag, small end down, tapping it down so that it makes a socket in the drag about ½-in. deep, as in Fig. 1. Next, place the cheek on the drag, which should be dusted with a suitable parting material. To ram the cheek, first go completely around the pattern carefully to prevent it from shifting or from jumping out of its socket in the drag. Then ram completely to the top as shown in Fig. 2.

If the parting on top of the cheek is flat, the cope can be rammed against a flat surface. If the parting is concave or convex, place a plywood head supported by suitable legs in the pattern and make up the cope

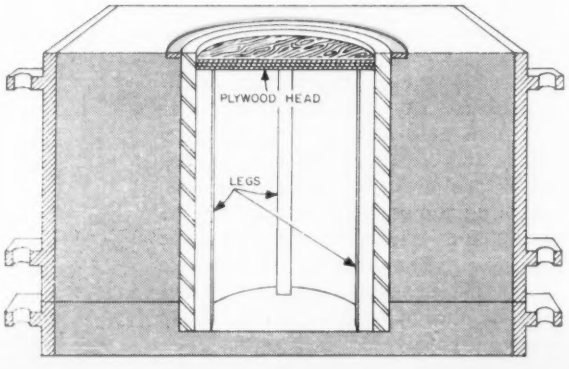

Fig. 3—With convex or concave parting, place plywood head supported by legs in the pattern and make up cope against head and cheek

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AO 1481 RA
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Many prefer it because no adjustments are needed. Easy on, easy off. Spring steel frame protects leg from impact. Air space for insulation between leg and legging. Chrome-tanned leather flare with spring clip.

AO 5 x 357 GLOVE

Gunn style, 13½″ long. Horsesplit leather palm and fingers. Seam at base of fingers, double stitches, flat seam for extra comfort. One-piece aluminized asbestos back. Wing thumb. Full lining.

AO 204 RA-44 COAT

Provides complete aluminized protection for upper body. Wool collar protects neck. Snap fastener adjustment on cuffs for snug fit. All snap fasteners on front have leather-pull tabs for quick removal. All seams double stitched. Coat lengths 30″, 36″, 40″, 44″, 48″, 50″. Sizes: small, medium, large, extra large and extra extra large.

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After a few months' use, a prominent steel company is completely sold on Aluminized Protective Clothing which REFLECTS 90% OF RADIANT HEAT, WEIGHS HALF AS MUCH AS CONVENTIONAL ASBESTOS, AND HAS SUPERIOR ABRASION-RESISTANCE (won't peel or crack)!

AO† Aluminized Asbestos Clothing is highly recommended for cupola and ladle pouring in foundries, open hearth, blast furnace and electric furnace tapping and other exposures to high radiant heat. AO Aluminized Duck is advised for less severe exposures. Check with your AO Safety Products Representative on leggings, spats, mittens, gloves, coats, jackets, sleeves, pants, overalls, coveralls, aprons, and hoods.

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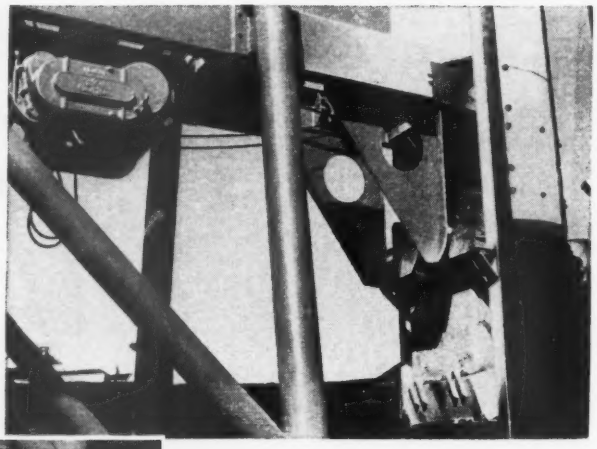
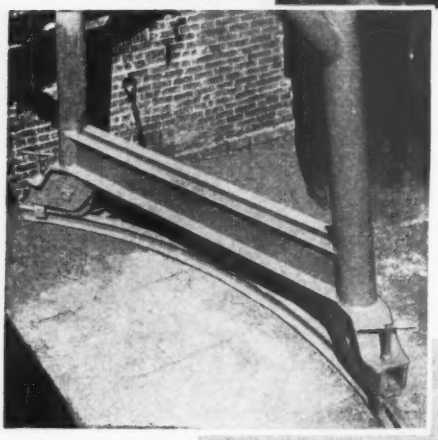
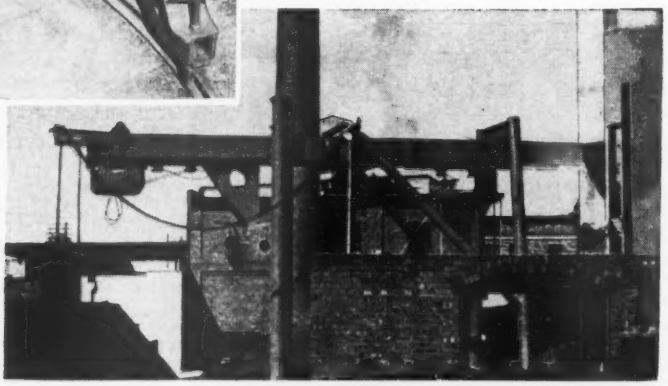




Three views of the Columbiana Automatic Cupola Charger: Top shows close-up of machine; left shows its mobile base; bottom shows complete setup.



The Columbiana Automatic Cupola Charger shown is capable of placing 1000-lb. charges every 1½ minutes. The machine is entirely automatic, but its movements may be controlled by an operator. Services of only two men are required for weighing and placing the charge in the charging bucket. A single control button starts the automatic cycle that lifts the load vertically 25 feet, then carries it horizontally into the cupola, where the bucket is lowered and discharged, after which it returns automatically. This machine is entirely new, but the manufacturers have several sizes available. Call or write:

MACHINE DIVISION

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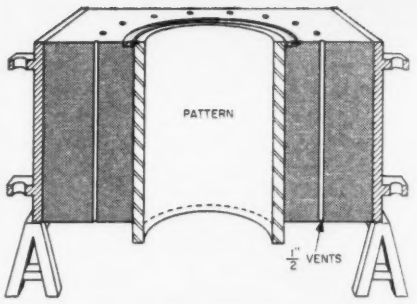

Fig. 4—Lift the cheek off the pattern and place it on horses

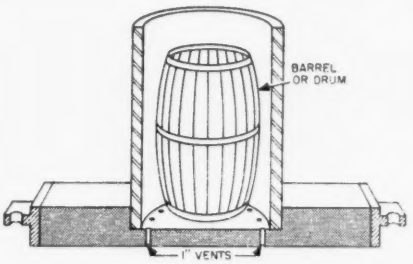

Fig. 5—Leave 6 to 8-in. space between drum and pattern, all around. Top of drum should be within 4 in. of top of pattern

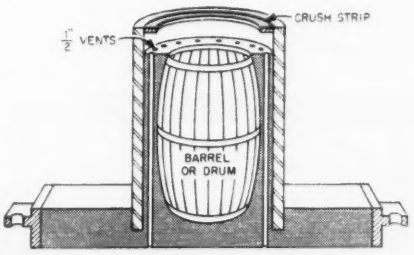

Fig. 6—Sweep the crush strip around ID of pattern, just as was done here with the cheek

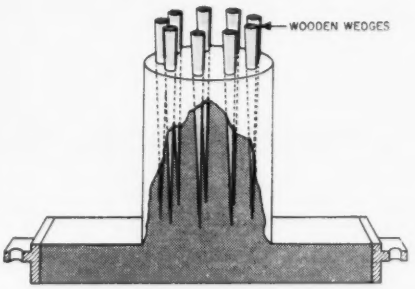

Fig. 7—When casting starts to set and shrink, wooden wedges should be drawn up and out so that core will collapse easily

against the head and cheek (Fig. 3). Remove the cope and use a small metal sweep such as shown here to sweep a 3/16-in. crush strip 2 in. wide completely around the pattern. With a ½-in. rod, punch vents, from the top of the cheek to the drag, about 2 in. away from the crush strip and about 4 in. apart.

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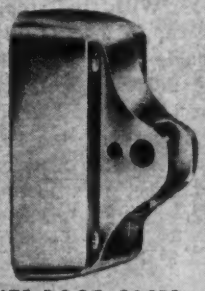
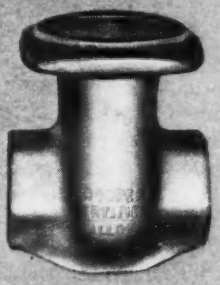


BRONZE DOOR CASES—
"Machining and polishing cut 50%"



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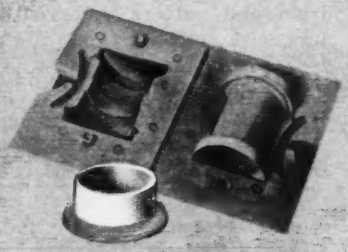

NICKEL-BRONZE DRAIN HEADS—
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YOKES—
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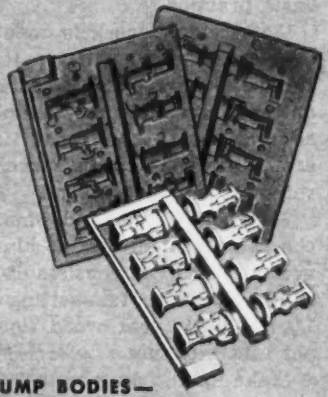

PUMP BODIES—
"Machining reduced or entirely eliminated"

Why are so many foundries turning to shell molding? Why are so many of their customers specifying shell-cast parts? The answer is simple: *Shell molding cuts costs.* Smoother surface finish, greater dimensional accuracy, and greater yield per man-hour are among its advantages over conventional sand-casting methods. (Note the brief testimonials—from G-E files—that tell the story!)

Ask G.E. about shell molding

General Electric offers a number of foundry products to help you get maximum benefits from shell molding: *G-E phenolic shell-molding resins* to form light, dimensionally accurate molds . . . *G-E silicone parting agents* to secure quick, easy release of molds from patterns . . . *G-E phenolic bonding resin* to cement shell halves together.

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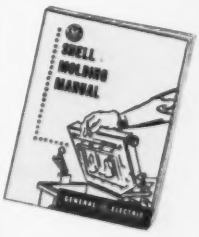

How can shell molding help YOU? General Electric, a major supplier of resins and release agents for the shell-molding process, has prepared an informative 28-page booklet telling about the techniques and benefits of this new foundry method. For a free copy of *G-E Shell Molding Manual,* just write to General Electric Company, Section 522-2A, Chemical Materials Department, Chemical and Metallurgical Division, Pittsfield, Massachusetts.

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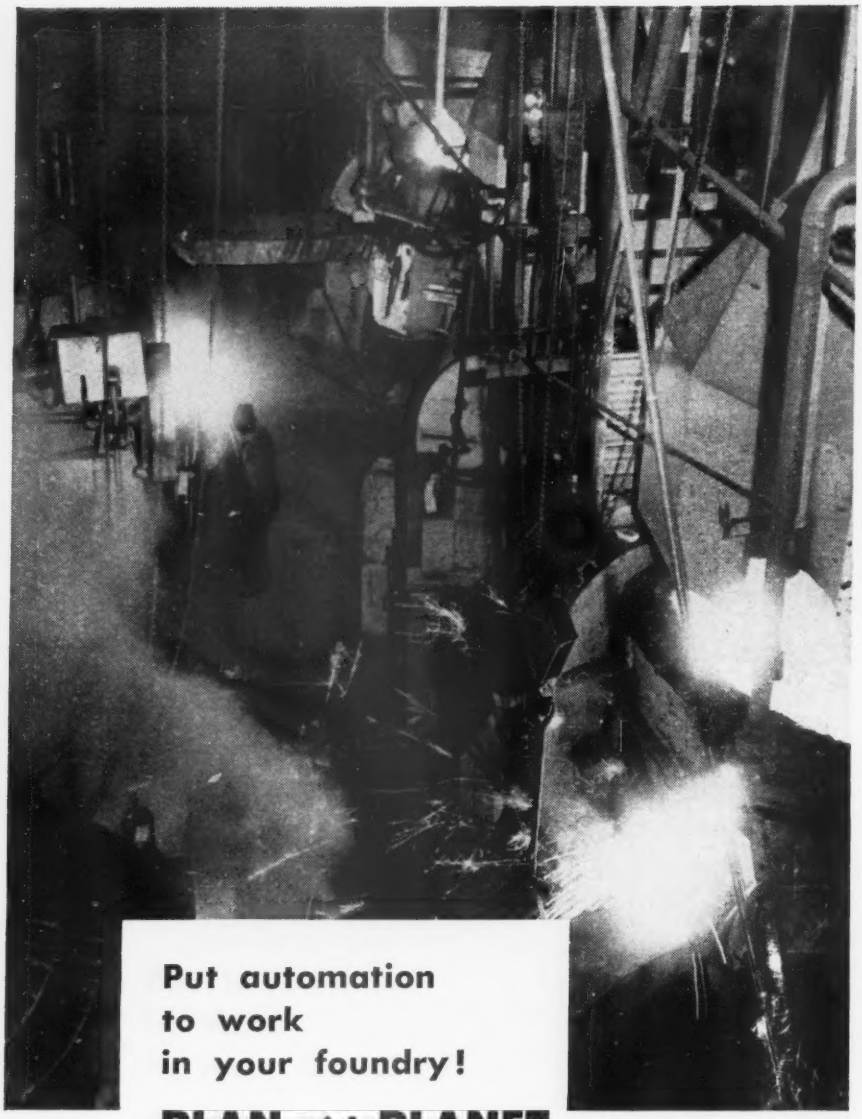

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Next, lift off the cheek containing the pattern and set it on horses (see Fig. 4). With this step, the pattern can be rapped evenly all around from the inside with a mallet. It then can be drawn easily, and the cheek can be patched, slicked, sprayed, etc. To skin dry it, place a charcoal basket in the cheek and cover the top with a sheet metal cover supported at each corner by a brick.

Next, return the pattern to the socket in the drag in the same position it occupied when the cheek was rammed. On the drag, in the center of the pattern, place a perforated metal drum or a wooden barrel. Its diameter should be such as to leave a 6 to 8-in. space between it and the pattern, all around, and the top should come to within 4 in. of the top of the pattern, as in Fig. 5.

Then run several loops of core paste or a talc dough around on the drag midway between the pattern and the drum. To prevent the casting from bleeding into the hollowed-out center of the core, the joint between the green sand core and the drag must be very tight. Finish the core by ramming carefully between drum and pattern and venting the area with the ½-in. rod. Be careful not to get too close to the crush strip, which is swept around the ID of the pattern with the sweep (Fig. 2B), as was done with the cheek in Fig. 6.

The OD of the pattern can be rapped properly all around, then drawn off, and the core can be patched, slicked and dried. Next steps are to paste up the joints, close up, clamp, weight, bank sand around the job and pour it off.

Use of Cement-bonded Sand—Now let's consider cement-bonded sand. Unless a man has had considerable experience in making heavy copper-base alloy castings in green sand or loam, cement-bonded sand is his best bet. What follows here is only the basic practice.

Most cement work is done on roll-over machines, with patterns in frames or coreboxes. Molds are dried on the plates and then assembled like a core mold. A cofferdam is placed around the job and the space between rammed with green sand.

For both large and small work, the same cement mix is almost universally used. It consists of 10 parts silica, 1.3 parts fast-setting cement, 1½ to 2 per cent wood flour and 6 per cent moisture.

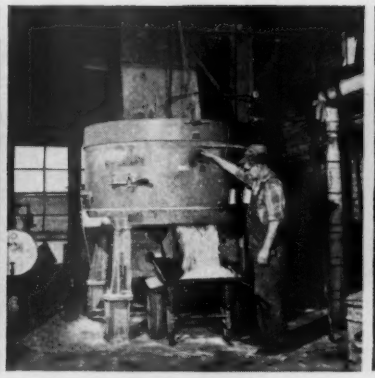
Make up the drag as in Fig. 1. Remove the pattern and allow the drag to air dry for several hours, until it has set enough not to be disturbed when the cheek is rammed. Next,

PROVED SUPERIOR

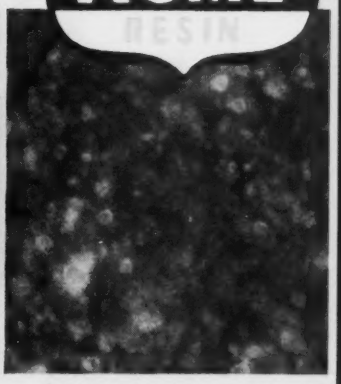
ACME RESIN

1 MULLING, tacky stage. Cold sand, liquid resin, and catalyst are charged into a standard muller.

2 MULLING, free-flowing stage. Each grain of sand *uniformly* coated —no critical control necessary.



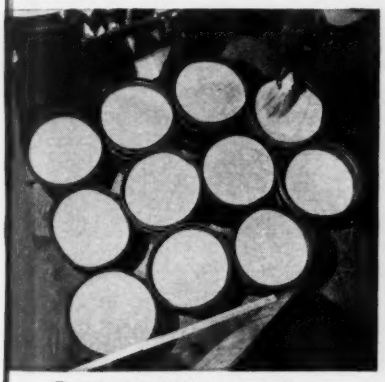
3 DISCHARGING. Sand is *dust-free*, cannot segregate from resin, green strength is controllable.



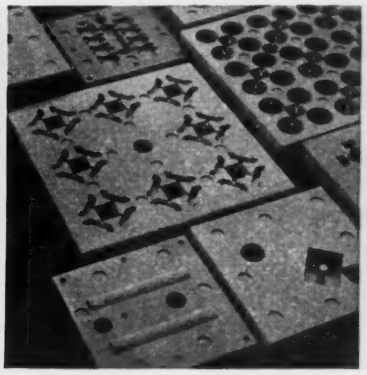
4 TWENTY-POWER magnification of resin-coated grains of sand after mulling process.

PlastiSand PROCESS

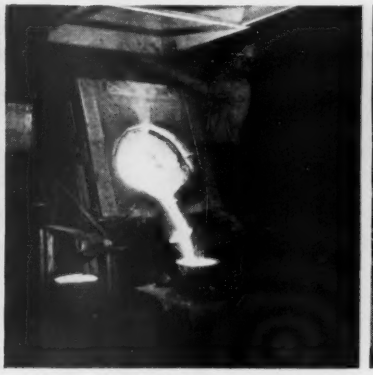
Resin formulation and the coating process covered by Patents Pending



5 COATED SAND, ready for use. Extremely *high tensile strength* at resin contents of from 2% to 4%.



6 BLOWN SHELL CORES. *Non-segregating* qualities lend themselves perfectly to shell and core blowing techniques.



7 STACK POURING of Alnico magnets, 12 to 16 high. 2% of resin produces necessary *high strength*, saves time and space.

8 SHAKE OUT—good collapsibility makes for easier shake out and better cleanup.

Pictures courtesy Mr. Raymond Kelly, Superintendent, Arnold Engineering Foundry, Marengo, Ill.

PLASTISAND Process utilizes a revolutionary new method for coating sand with liquid-resin for foundry shell molding.

This new development by Acme Resin Corporation in the field of shell molding has several positive advantages that overcome the primary deterrents to the use of the more widespread "C" or shell molding process.

Foundries using the PLASTISAND Process report PROVED SAVINGS, PROVED SAFETY and PROVED SUPERIORITY of molds with as little as one-half the resin content formerly necessary with dry resin.

With the PLASTISAND Process, a shorter dwell is possible and a faster cure is assured, from a shorter time on the pattern and a faster baking cycle.

Acme's new PLASTISAND Process is adaptable to dump-box, roll-over and blowing of either shells or cores. It uses either hot or cold mulling—in both. Acme liquid resin is used.

An informative folder has been prepared to better acquaint the foundry industry with the new PLASTISAND Process. It may be obtained by writing to the ACME RESIN Corporation at the address listed here.

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And that *extra* protection and wearer comfort is possible because of this unique, patented geodetic crown strap and pneumatic head band, developed by Cornell Aeronautical Laboratory, Inc.

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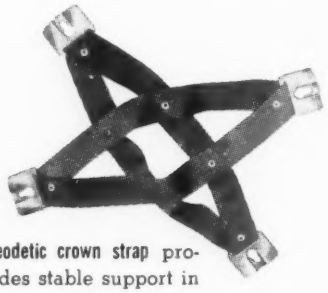
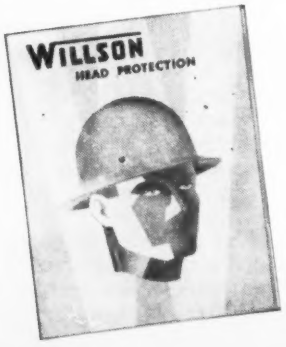
Super-Tough® hat cut away to show how the patented head gear fully cradles the head.



Geodetic crown strap provides stable support in all directions with no concentration of load in tie string on top of the head.



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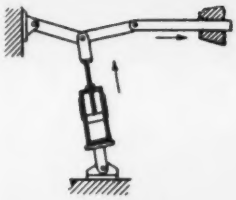
cut newspaper and place it on the drag, which should be dusted with parting sand. The newspaper will make the cheek-drag parting. Ram the cheek in the usual manner, cut the crush strip and vent the cheek. Remove the pattern, but do not remove the cheek until it has set sufficiently.

Make the cope as in green sand, but make the parting with newspaper and allow time for the set. Be sure the cope is extra rigid. The core is made just as it is in green sand.

In cement work, the following basic rules are essential. Observing them will pay off in good results:

1. Cement sand mix has very little green strength and cannot be lifted for several hours after it has been rammed.
2. The mix is subject to cracking or chipping when dry. Avoid mechanical shock, etc.
3. Molds can be made in snap-type iron and steel flasks which are removed after the sand sets, to permit air-drying.
4. Work the mix on the wet side.
5. Because the mix has good flowability, just ram sufficiently to make sure that it has filled details of the pattern and no uncompacted spots are present.
6. Use bars, rods, corebutts and brick bats to give strength and reduce the amount of cement sand required.
7. Use only fast-setting cement.
8. Blend the mixture thoroughly.
9. Oil the pattern lightly to prevent the sand mix from sticking.
10. Do not dry cement molds artificially. Allow them to dry for a minimum of 72 hours, then assemble and pour.
11. Vent all internal cores heavily. Vary wood flour to give desired collapsibility to the cores.
12. Coat all green surfaces which will come in contact with the metal with a completely oilless wash. Use talc, silica flour, plumbago with molasses water, lignin sulphite water or a good prepared oilless core or mold wash.
13. Cut a crush strip when a mismatch where partings come together could cause an edge to break or crush into the job during closing up, weighting or clamping. Like core molds, cement molds have little or no give to them.

Here Are the Answers—Let's return now to some of your specific questions. To eliminate your hot tear, check and reduce your hot strength; reduce the clay and/or add some wood flour. For this heavy core, you can cut long, tapered wooden wedges and ram them up in the core vertical-



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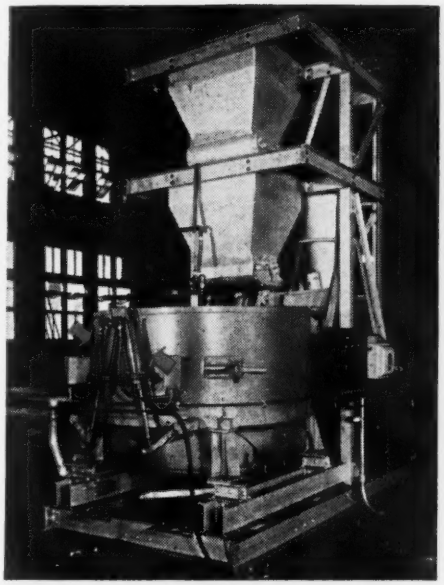
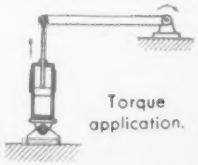
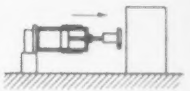


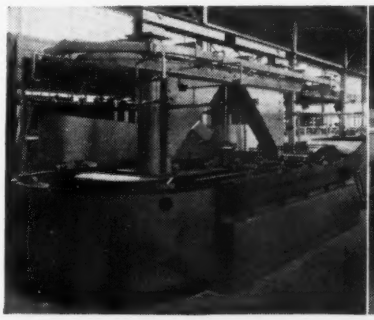
Hanna Air-operated Cylinders supply reliable, controlled power for operation of mixer discharge gates.



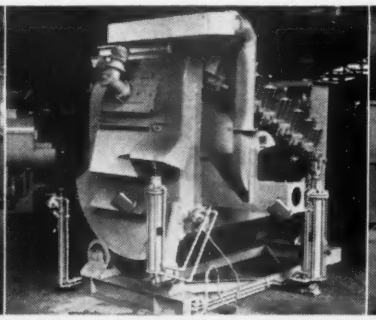
Torque application.



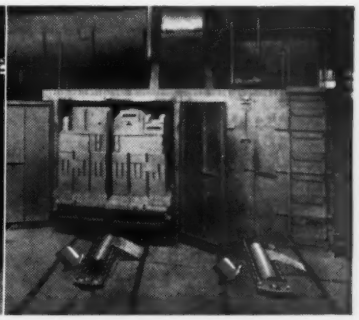
Push, pull, lift, clamp.



Cylinder power is fast and exacting for moving material horizontally or vertically in immersion tanks.



One Hanna Cylinder operates doors and another tilts this furnace as required.



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ly, with the small end down and the tops exposed through the cope. Keep them about 3 in. from the outside of the core. When the casting starts to take a set and shrink, draw the wooden wedges up and out, leaving the core to collapse easily, as in Fig. 7.

You should be able to gate a bushing of this size over the top. Investigation shows that 90 per cent of top-gating failures are due to either explosion or erosion, the product of a weakly bonded sand and a wet or improperly vented mold. Don't believe that molten metal poured in a sand mold acts like water. It develops a sheath or skin and does not disturb the sand like water.

Should you decide to bottom pour through the cheek or down through the core, run the gates on a tangent and pour on the hot side since you will be pushing cold metal from the drag up. When the risers start to show metal, stop off the sprue and go over into the top with hot metal. When you gate through the cheek, do not spray or black the sprue if the mold is made in green sand. It is almost impossible to dry the sprue properly unless you have a long, thin electrical strip heater element to fit into the sprue.

Loam is used for very large work as a rule, but it requires thorough experience. Cement sand is replacing loam work in many shops, especially for extremely large work.

CHARLIE

Book Review

Symposium on Non-Destructive Testing, 98 pages, 6 x 9 in., published by the American Society for Testing Materials, 1916 Race St., Philadelphia 3. Price $2.

Contains eight papers which were presented at the 1952 annual meeting of the American Society for Testing Materials. Titles and authors include: "Comparison Radiographs of Welds" by Alexander Gobus and N. A. Kahn; "Fluoroscopy and Radiography with Iridium 192" by C. Garrett, A. Morrison, and G. Rise; "Weld Radiography—a Tentative Method for Quantitative Evaluation of Defects" by Oscar Masi; "Critical Study of Techniques for the Testing of Materials by Ultrasonic Methods" by Paul Bastien; "Progress in the Field of Non-destructive Testing Through Use of Ultrasonics" by W. C. Hitt; "Comparison of Non-destructive Tests on a Damaged Sternpost" by A. deSterke and H. denHartog; "Practical Application of Ultrasonic Non-destructive Testing" by W. A. Felix, and "Non-destructive Electronic Sorting of Metals for Physical Properties" by Fritz Foerster.

Shell Molding
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...with
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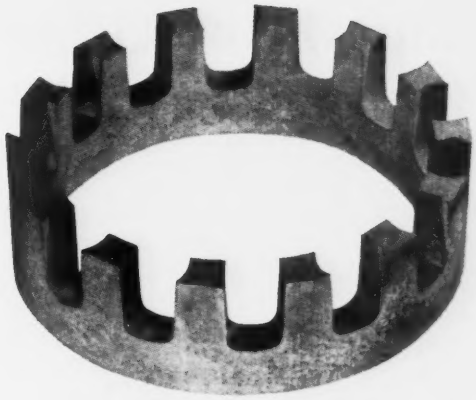

SHELL MOLDED CASTING

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SHELL MOLD RESINS THAT FIT THE JOB

CALIFORNIA DISTRICT FOUNDRYMEN TO MEET

In Pasadena Conference, Mar. 25-26

SOUTHERN California Chapter of the American Foundrymen's Society will be host at the California Regional Foundry Conference on Friday and Saturday, Mar. 25-26. Co-sponsored by the Northern California Chapter, the meeting will be held at the Huntington - Sheraton Hotel, Pasadena, Calif.

Technical program of the conference includes two discussions each on iron, steel, bronze and aluminum foundry practice. In addition, two general interest sessions will be held.

On the social side, Columbia-Geneva Steel Division, U. S. Steel Corp., will be host at a fellowship hour preceding the Friday dinner, and Kaiser Steel Corp.'s Pig Iron Division will do similar honors at the conference's conclusion Saturday afternoon. A special program is planned for the ladies.

Chairman of the general committee in charge of the conference is William C. Baud, Mechanical Foundries Division, Food Machinery & Chemical Corp., Vernon, Calif. Otto H. Rosentreter, Otto H. Rosentreter Co., South Gate, Calif., heads the technical section, while Robert M. Ditmore, Red Seal Metals Co., South Gate, Calif., and William C. Cameron, Federated Metals Division, Los Angeles, are chairman and co-chairman of the arrangements section. Other committee members are John Russo, Russo Foundry Equipment Co., Oakland, Calif., representing Northern California, and S. L. Jackson, Electro Metallurgical Co., Los Angeles, program chairman for the conference participation in the Western Metal Congress starting in Los Angeles Mar. 28.

Other committees and their chairmen include: Publicity, Edward Haines, H. Kramer & Co., chairman, Warner G. Stenberg, U. S. Electrical Motors Inc., Los Angeles, co-chairman; Housing, Bruce Farrow, Barker Foundry Supply, Los Angeles; Reception, Jack Crawford, Independent Foundry Supply Co., Los Angeles; Tickets, Rayburn Orr, Howell Foundry Co., Los Nietos, Calif.; Registration, Stanley Rauen, Snyder Foundry Supply Co., Los Angeles; Ladies Entertainment, Mrs. Charles R. Gregg, San Marino, Calif.

The conference is timed to precede the ninth Western Metal Congress and Exposition sponsored by the American Society for Metals, Mar. 28-Apr. 1, in Los Angeles. The exposition will be held at the Pan Pacific Auditorium. California's AFS chapters, as well as the ASM, Society for Nondestructive Testing and the American Welding Society will conduct technical sessions during the congress.

The AFS program will be presented Mar. 28 at 7 p. m. at the Ambassador Hotel in Los Angeles. Papers to be presented are: "Ductile Iron and Its Applications," by Morris Asimow, owner, Enterprise Ductile Iron Foundry Inc., Los Angeles; "What Does Shell Molding Offer to the Producer and User of Castings?" by Walter H. Dunn, Pacific Alloy Engineering Corp., El Cajon, Calif.; and "An Engineering Appraisal of the Investment Casting Process," by James B. Price, Arwood Precision Castings Corp., Los Angeles.

Friday, Mar. 25

9:30 a.m.—**Registration,** Huntington-Sheraton Hotel, Pasadena, Calif.

11:30 a.m.—Luncheon. Speakers: Charles R. Gregg, president, Gregg Iron Foundry, El Monte, Calif., and chairman, Southern California Chapter, AFS; Herbert F. Scobie, editor, *American Foundryman,* Chicago. Session Chairman, Myron Niesley, California Testing Laboratories, Los Angeles.

1 p.m.—Sectional Meetings.

Cast Iron: **"Improved Methods in Foundry Practice,"** Harry Kessler, manager of foundry operations, Sorbo-Mat Process Engineers, St. Louis.

Bronze: **"Major Factors Influencing the Quality of Aluminum and Copper-Base Alloys,"** Donald L. LaVelle, assistant manager, Aluminum Department, Federated Metals Division, American Smelting & Refining Co., Perth Amboy, N. J.

Steel: **"Scientific Approach to the Feeding of Castings—Its Present Status and Its Future,"** Malcolm MacGregor, metallurgist, General Metals Corp., Oakland, Calif.

Aluminum: **"Production of Aluminum Alloy Specification Castings,"** Roy E. Payne, chief metallurgist, Aluminum Co. of America, Vernon, Calif.

6 p.m.—Fellowship Hour — Columbia-Geneva Steel Division, U. S. Steel Corp., host.

7 p.m.—Dinner. Chairman, B. G. Emmett, works manager, Los Angeles Steel Casting Co., Los Angeles.

8:30 p.m.—**"New Developments in Foundry Welding,"** Jonathan Marden, technical advisor, Eutectic Welding Alloys Corp., New York.

Saturday, Mar. 26

10 a.m.—Sectional Meetings.

Steel: **"Making Steel Castings with Sand Reclaimed by the Dry Method,"** William D. Emmett, general superintendent, Los Angeles Steel Casting Co., Los Angeles.

Aluminum: **"Popular Aluminum Casting Alloys,"** John J. Stobie, Apex Smelting & Refining Co., Long Beach, Calif.

12 noon—Luncheon. Chairman, Leonard Hofstetter, president, Brumley-Donaldson Co., Los Angeles.

1:30 p.m.—Sectional Meetings.

Iron: **"Basic Principles of Sand Control,"** Harold E. Henderson, sand technician, H. C. Macauley Foundry Co., Berkeley, Calif.

Bronze: **"Effective Essentials Required To Make Good Castings,"** William Ball Jr., R. Lavin & Sons Inc., Cincinnati.

3 p.m.—**"Gating and Risering of Castings as Affected by Exothermic Materials,"** Michael Bock II, Exomet Inc., Conneaut, O.

5 p.m.—Fellowship Hour—Pig Iron Division, Kaiser Steel Corp., Fontana, Calif., host.

HOW TO DO IT

Device Stops Mold Runouts, Ladle and Trough Leaks

By R. L. NELSON
Birmingham, Ala.

MOST mold runouts and ladle and trough leaks can be stopped quickly and easily by use of a handy, easily constructed device consisting of two circular pieces of ¼ or ⅛-in. steel plate, centered and welded about 1 in. apart on the end of a ½-in. steel rod about 6 ft. long. Outside diameter of the circular pieces are cut to fit inside a quart oil can.

One end is cut smothly from the oil can. A hole large enough to pass the rod is punched in the center of the other end. Can is slipped over and down the rod so the circular pieces are against the bottom and inside the can. The can is filled with soft daubing mud.

For use, the open end of the can is pressed against the leak and the handle is pushed to press the daubing mud into the leak. The can serves to hold the mud on the end of the "bot stick." The mud in the can may be kept soft by setting the charged apparatus in water.

Do you have any tricks of the trade tucked away with your foundry experience? Why not release them to fellow foundrymen? FOUNDRY will pay a minimum of $15 for each idea submitted and published. Send a photo or drawing with your idea

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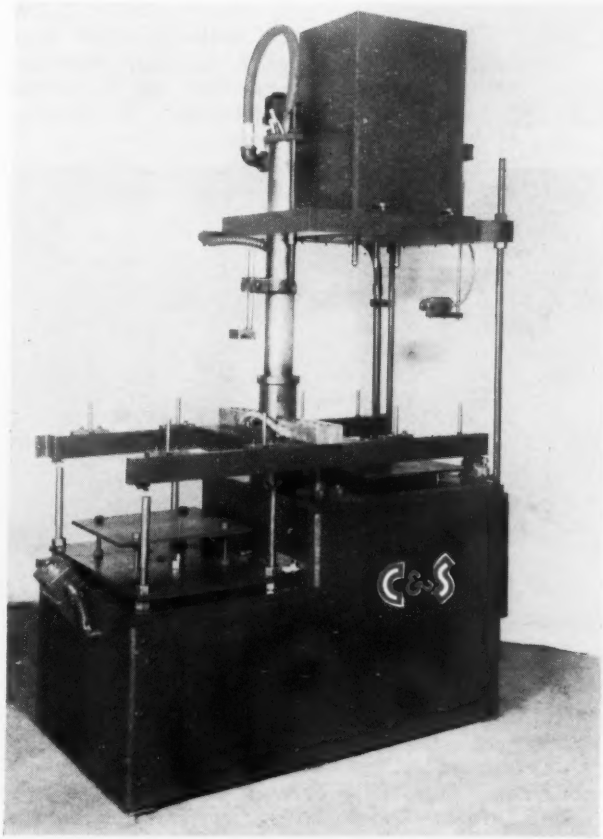

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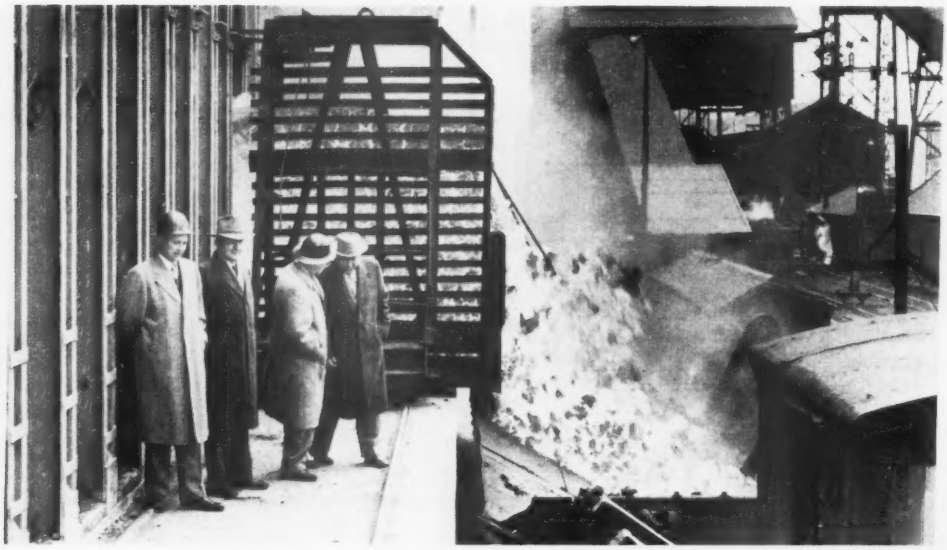
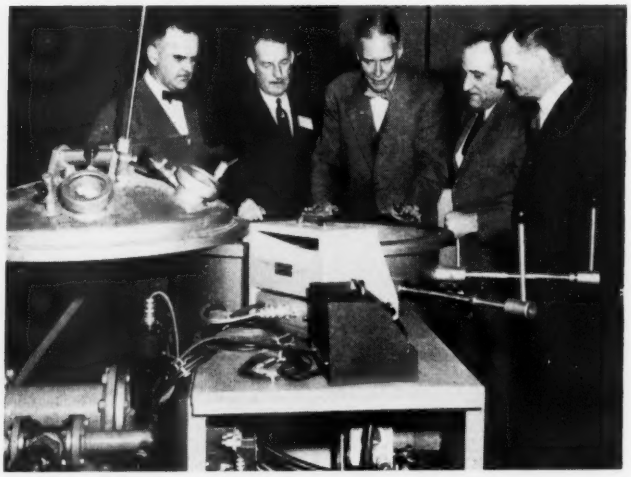
NEWS VIEWS



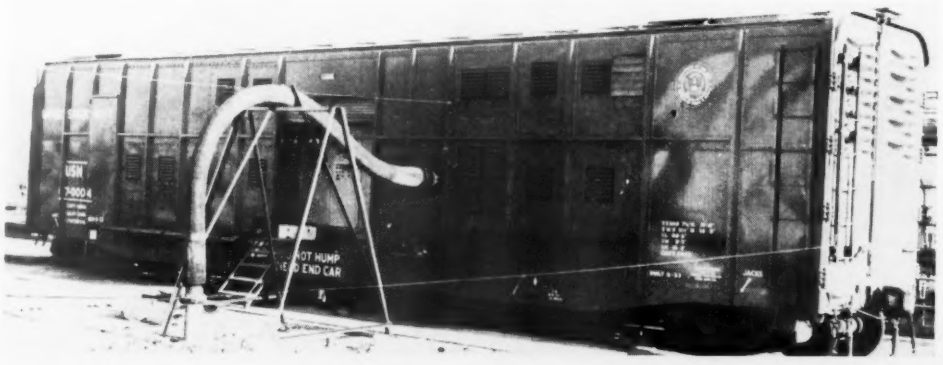
COKE TIME: A five-year rebuilding program recently was completed with pushing of 10 tons of coke from "C" battery at American Steel & Wire Co.'s Cleveland Coke & Chemical Works. Four sister batteries can now receive a daily charge of 830 tons of coal each and produce 600 tons of coke, 5000 gal tar, 13,000 lb of ammonium sulphate and 2000 gal of benzol products. At left, left to right, are J. E. Allen, general superintendent, H. L. Jenter, Cleveland district manager, E. A. Brady, works superintendent, and G. Curran, superintendent of batteries

SAFETY FIRST: National Safety Council and Aetna Insurance Co.'s Special Awards of Merit for a top-flight safety record of 1,100,114 man-hours without a disabling injury over a six month period has been awarded to Axelson Mfg. Co., Division of U. S. Industries Inc., Los Angeles, Calif. At presentation ceremonies above, left to right, are A. G. Munro, supervising safety director, Aetna Insurance Co., Charles Adams, director of industrial relations, Axelson Mfg. Co., W. W. Greenway, vice president U. S. Industries Inc., and general manager, Axelson Mfg. Co., and M. A. Hoffman, vice president, greater Los Angeles Safety Council. The injury-free record was attained at Axelson's Montebello, Calif., aircraft component plant

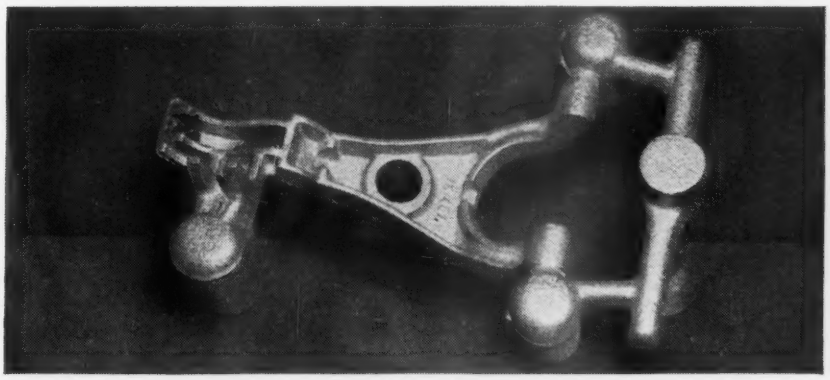


100th FURNACE: National Research Corp., Cambridge, Mass., recently commemorated with a plaque the shipment of its 100th commercial-size vacuum furnace. The honored unit was shipped to the Cast Iron Research Institute in Great Britain. Gov. Herter of Massachusetts presented the plaque to William Barker, British Consul-General in Boston. Above left to right are W. A. Coolidge, chairman of the board, NRC, R. S. Morse, president, NRC, Gov. Herter, Richard Preston, commissioner, Department of Commerce of the Commonwealth of Massachusetts, and Mr. Barker

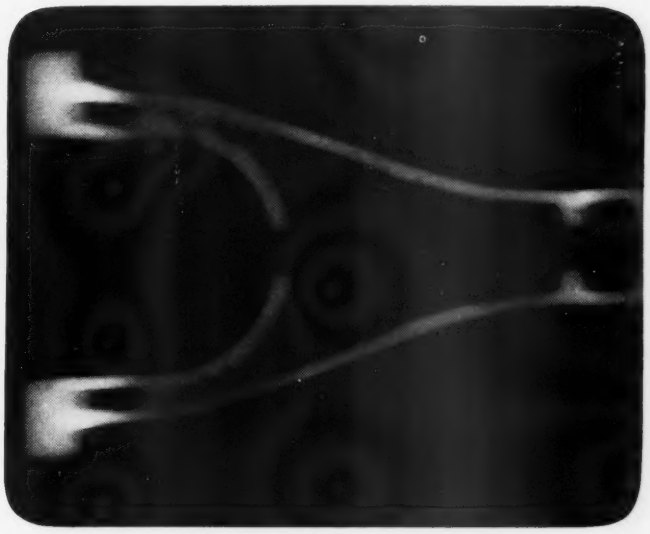
MOBILE COMPRESSOR: Clark Bros. Co., Olean, N. Y., has constructed for the Navy a mobile compressor unit that can supply a volume of 5000 cfm at a pressure of 125 psi. Complete with 500-hp electric motors, switchboard, transformers, cooling and lubricating systems, the unit fits into a 60-ft railroad car. Equipment weighs 138,000 lb



Shrink steals strength — and profits



— RADIOGRAPHY points the way to avoid it



THIS steel fork lever was designed to take a specific load. Would it hold up? Not if shrinkage had robbed its strength.

But here is where radiography came in with double-barreled effect. First the radiographs which were made showed the foundryman that internal shrinkage was present. Then the radiographs disclosed a recurring pattern of these defects, thus suggesting a change in molding which greatly reduced the difficulty.

This is typical of the ways radiography helps the foundryman make sure only satisfactory work is delivered and so builds a reputation for high-quality castings.

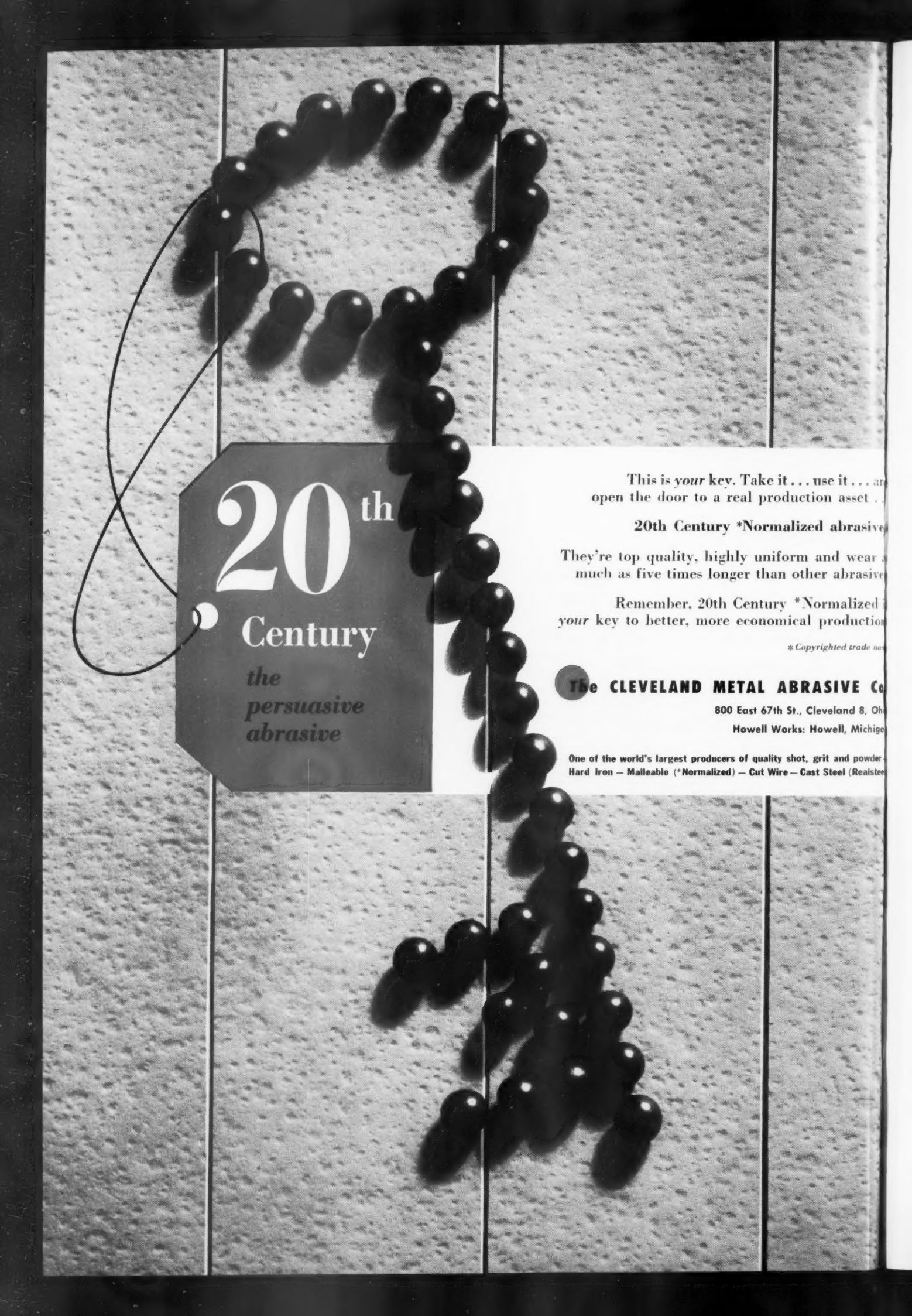
If you'd like to know how it can improve your own operations, talk it over with your x-ray dealer. Or, if you like, write us for a free copy of "Radiography as a Foundry Tool."

EASTMAN KODAK COMPANY, X-RAY DIVISION, ROCHESTER 4, N. Y.

Radiography

— another important example of Photography at Work

Kodak



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One of the world's largest producers of quality shot, grit and powder
Hard Iron — Malleable (*Normalized) — Cut Wire — Cast Steel (Realstee

FOUNDRY STATISTICS

MALLEABLE IRON

(Shipments of castings—net tons[1])

	Shipments		
	Total	For Sale	Unfilled Orders[2]
1952	926,120	573,472	.....
1953			
Nov.	63,663	37,561	93,156
11 mo.	898,107	539,128	.....
Dec.	72,399	39,721	95,612
Total	970,506	578,749	.....
1954			
Jan.	70,288	38,266	85,565
Feb.	69,078	37,792	81,579
Mar.	84,342	47,125	74,219
Apr.	74,515	39,102	69,094
May	67,856	37,306	67,040
June	72,820	41,121	60,163
July	50,893	25,243	63,711
Aug.	59,259	34,528	62,494
Sept.	58,015	33,929	66,742
Oct.	64,321	36,956	71,090
Nov.	70,030	41,609	80,686
11 mo.	731,417	412,977	.....

ALUMINUM

(Shipments of castings—1000 pounds)

	Shipments				
	Total	Sand	Perm. Mold	Die	Unfilled Orders[2]
1952	518,979	194,616	146,883	169,732	.....
1953					
Nov.	51,014	16,169	15,396	19,012	106,977
11 mo.	606,451	199,288	183,118	220,367	.....
Dec.	51,571	15,265	16,907	18,963	105,980
Total	658,022	214,553	200,025	239,330	.....
1954					
Jan.	51,446	14,698	16,615	19,709	103,318
Feb.	51,213	14,696	17,281	18,754	96,011
Mar.	56,184	14,468	19,576	21,645	93,407
Apr.	53,006	14,073	18,091	20,366	91,853
May	47,663	12,461	16,312	18,368	83,848
June	48,061	12,442	17,105	17,886	79,126
July	39,636	11,299	13,749	14,004	76,513
Aug.	42,429	11,252	15,335	15,213	76,684
Sept.	46,249	10,717	16,641	18,228	79,873
Oct.	53,901	12,765	19,238	21,245	88,518
Nov.	55,224	12,934	20,396	21,296	94,491
11 mo.	545,012	141,805	190,339	206,714	.....

COPPER-BASE ALLOY

(Shipments of castings—1000 pounds[1])

	Shipments			
	Total	Sand	Perm. Mold	Unfilled Orders[2]
1952	1,009,910	910,862	63,865	.....
1953				
Nov.	74,782	66,370	5,077	48,842
11 mo.	922,821	819,548	56,234	.....
Dec.	77,675	68,821	5,082	48,421
Total	990,496	888,369	61,316	.....
1954				
Jan.	71,437	63,034	4,618	42,351
Feb.	68,849	60,913	4,743	21,943
Mar.	76,480	67,952	5,123	38,417
Apr.	72,900	65,418	4,732	34,111
May	67,859	61,469	3,755	31,568
June	70,777	64,328	3,567	30,743
July	56,380	51,070	3,073	30,872
Aug.	68,891	63,389	3,547	28,883
Sept.	68,267	62,152	3,637	31,087
Oct.	70,276	63,855	3,619	30,296
Nov.	70,020	63,065	4,089	25,915
11 mo.	762,136	686,645	44,503	.....

MAGNESIUM

(Shipments of castings—1000 pounds[1])

	Shipments		Unfilled Orders[2]
	Total	For Sale	
1952	34,857	32,977	.....
1953			
Nov.	2,681	2,417	10,612
11 mo.	31,826	29,035	.....
Dec.	2,691	2,434	9,313
Total	34,517	31,469	.....
1954			
Jan.	2,451	2,149	8,800
Feb.	2,194	1,945	8,315
Mar.	2,407	2,109	7,698
Apr.	2,068	1,857	7,358
May	1,738	1,541	7,522
June	2,034	1,820	8,296
July	1,924	1,712	8,073
Aug.	2,157	1,944	7,795
Sept.	2,059	1,855	7,474
Oct.	2,092	1,876	7,294
Nov.	2,168	1,913	6,868
11 mo.	23,292	20,721	.....

PRODUCTION WORKERS

Estimated Number

(Thousands)

	Nov. 1954	Oct. 1954	Nov. 1953
Ferrous	187,000	184,500	203,600
Nonferrous	63,500	60,600	72,400

Average Weekly Earnings

Gray Iron	75.83	75.05	73.47
Malleable Iron	77.61	77.02	71.63
Steel	75.20	76.00	76.63
Nonferrous	84.24	84.25	80.00

Average Weekly Hours

Gray Iron	39.7	39.5	39.5
Malleable Iron	39.8	39.7	37.9
Steel	37.6	38.0	38.7
Nonferrous	40.5	40.9	40.0

Labor Turnover Rate (November)

(Per 100 employees)

	Total Accession	Total Separation	Quit	Layoff
Gray Iron	4.2	2.3	0.8	1.2
Malleable Iron	5.4	2.1	1.0	0.6
Steel	2.0	4.2	0.7	3.2
Nonferrous	7.1	2.9	0.9	1.6

Source: Bureau of Labor Statistics

GRAY IRON CASTINGS—SHIPMENTS

(Net tons[1])

	All Castings		Miscellaneous Castings		Heavy Steel Ingot Molds		Chilled Railroad Car Wheels	Pressure Pipe & Fittings	Soil Pipe & Fittings	Unfilled Orders[2]
	Total	For Sale	Total	For Sale	Total	For Sale	Total	Total[3]	Total[3]	
1952	12,869,464	7,371,700	8,122,274	3,792,567	2,238,309	1,070,252	544,896	1,312,518	651,467	.....
1953										
Nov.	1,008,908	569,561	592,145	269,577	229,013	112,234	31,332	102,275	54,143	977,012
11 mo.	12,670,970	6,935,639	7,813,090	3,397,602	2,599,439	1,279,596	437,131	1,190,891	631,419	.....
Dec.	1,036,932	558,204	636,747	277,852	229,720	109,887	30,011	94,707	45,747	954,885
Total	13,707,902	7,494,843	8,449,837	3,675,454	2,829,159	1,389,483	467,142	1,285,598	677,166	.....
1954										
Jan.	932,298	488,497	607,755	261,164	154,359	60,947	31,316	90,898	47,970	871,918
Feb.	936,364	491,983	607,085	252,591	156,933	70,261	29,240	92,546	50,560	865,344
Mar.	1,046,779	553,358	684,272	282,328	153,366	65,950	34,240	113,016	61,895	842,499
Apr.	995,052	528,027	657,126	263,147	126,083	56,114	29,075	116,420	66,348	826,491
May	943,335	516,475	605,385	247,623	122,839	57,106	27,144	122,514	65,453	775,278
June	986,810	556,047	616,317	261,133	141,712	70,060	30,883	130,503	67,395	803,570
July	821,151	449,621	510,173	209,294	131,180	62,681	22,902	98,810	59,086	828,924
Aug.	934,644	541,904	569,790	250,702	140,165	69,897	29,134	127,255	68,300	829,505
Sept.	921,232	533,909	559,934	248,124	139,679	68,053	25,374	124,821	71,424	810,654
Oct.	942,934	552,022	570,365	253,802	150,282	79,191	23,599	130,326	68,362	789,117
Nov.	997,301	547,447	623,390	258,933	167,983	85,703	25,723	118,480	61,725	759,613
11 mo.	10,457,900	5,759,290	6,611,592	2,788,841	1,584,581	745,963	298,630	1,265,589	688,518	.....

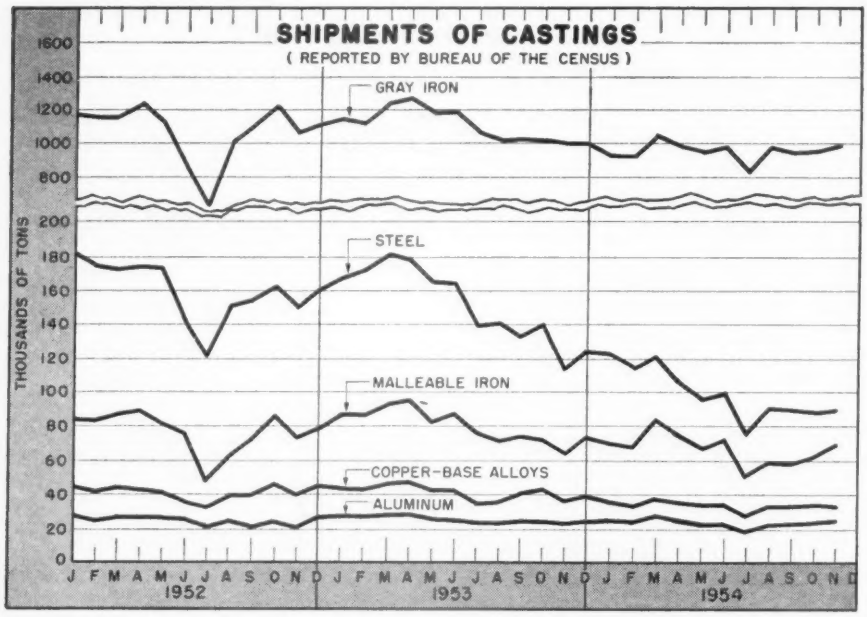
STEEL CASTINGS—SHIPMENTS

(Net tons[1])

	All Castings			Carbon Steel			Alloy Steel			Unfilled Orders[2]
	Total	For Sale	Railway Specialties	Total	For Sale	Railway Specialties	Total	For Sale[4]	Railway Specialties	
1952	1,927,942	1,476,242	339,561	1,375,233	1,076,285	298,948	552,709	389,816	40,613	.....
1953										
Nov.	114,229	85,047	17,768	79,314	63,086	16,228	34,915	27,108	1,540	308,526
11 mo.	1,710,902	1,307,714	302,345	1,191,122	914,621	276,501	519,780	387,236	25,844	.....
Dec.	123,295	92,299	18,665	85,607	68,617	16,990	37,688	29,914	1,675	278,389
Total	1,834,197	1,400,013	321,010	1,276,729	983,238	293,491	557,468	417,148	27,519	.....
1954										
Jan.	122,758	93,577	20,197	83,927	62,749	18,407	38,831	30,828	1,790	251,847
Feb.	116,520	88,699	17,938	81,433	60,638	15,961	35,087	28,061	1,967	234,634
Mar.	122,310	92,271	15,684	85,211	62,955	14,190	37,099	29,316	1,494	214,367
Apr.	105,788	78,754	11,031	72,118	52,389	9,538	33,670	26,365	1,493	197,857
May	94,610	70,596	9,454	64,546	46,651	8,342	30,064	23,945	1,112	182,502
June	100,022	72,881	8,639	69,021	48,327	7,552	31,001	24,554	1,087	169,594
July	75,848	53,207	5,815	50,453	33,461	4,964	25,125	19,746	851	170,567
Aug.	89,590	66,792	9,844	61,344	44,236	8,148	28,256	21,360	1,196	168,303
Sept.	88,359	64,722	8,668	59,039	41,735	7,690	29,320	22,009	978	158,823
Oct.	87,085	64,004	8,580	56,705	39,872	7,596	30,380	23,148	984	154,079
Nov.	87,659	64,812	7,742	56,057	40,057	6,624	31,602	23,609	1,118	175,715
11 mo.	1,090,549	810,315	123,092	739,854	533,070	109,012	350,435	272,941	14,070	.....

[1]Source: Bureau of Census. [2]For sale only. [3]All cast iron pipe is shipped for sale. [4]Railway specialties not included.

FOUNDRY STATISTICS



COKE PRODUCTION & CONSUMPTION

(Net tons)

	Production	Consumption Total	Consumption By Foundries
1952	68,254,109	67,865,639	3,102,446
1953			
Nov.	6,208,155	6,039,813	216,837
11 mo.	72,374,797	72,186,031	2,705,042
Dec.	6,093,009	6,041,383	210,388
Total	78,467,806	78,227,414	2,915,420
1954			
Jan.	5,812,426	5,639,117	224,298
Feb.	4,889,717	4,920,651	211,114
Mar.	5,146,189	5,177,765	228,139
Apr.	4,693,036	4,569,843	212,272
May	4,802,245	4,656,950	204,958
June	4,640,064	4,683,726	194,664
July	4,618,665	4,555,701	170,617
Aug.	4,510,603	4,501,477	195,344
Sept.	4,490,603	4,434,650	191,607
Oct.	5,082,374	5,100,135	208,418
Nov.	5,230,836	5,281,892	221,204
11 mo.	53,916,758	53,521,907	2,262,635

INGOT BRASS & BRONZE

(Shipments in net tons)

	1953	1954
Jan.	24,423	20,661
Feb.	25,429	19,920
Mar.	28,256	23,653
Apr.	25,044	24,746
May	21,660	22,269
June	20,818	22,348
July	19,321	17,074
Aug.	20,156	21,684
Sept.	21,463	22,464
Oct.	22,280	24,080
Nov.	21,860	23,061
Dec.	20,541	21,273
Total for year	271,251	263,233

COMMERCIAL HEAT TREATING

(National Billings of Metal Treating Institute Members)

	1952 No. Reporting	1952 Total Reported	1953 No. Reporting	1953 Total Reported	1954 No. Reporting	1954 Total Reported
July	56	$2,253,346	58	$2,522,651	61	$1,722,449
Aug.	57	2,287,135	60	2,452,186	62	1,801,659
Sept.	57	2,498,544	57	2,522,127	64	1,853,665
Oct.	57	2,837,574	59	2,782,219	62	1,916,504
Nov.	53	2,321,932	59	2,493,497	60	1,966,333
Dec.	52	2,431,975	57	2,219,406	62	2,099,847
Annual total		30,875,924		31,733,067		24,244,368

ZINC-BASE ALLOY

(Shipments of castings—1000 pounds[1])

	Shipments Total	Shipments For Sale	Unfilled Orders[2]
1952	408,353	282,673	.....
1953			
Nov.	37,668	26,097	69,367
11 mo.	482,592	321,674	.....
Dec.	38,661	27,348	64,105
Total	521,253	349,022	.....
1954			
Feb.	37,660	24,112	55,351
Mar.	42,991	28,828	52,544
Apr.	38,968	25,211	51,388
May	36,793	23,671	46,726
June	40,708	26,890	47,537
July	28,306	18,605	43,231
Aug.	34,639	24,898	46,288
Sept.	36,594	25,617	56,006
Oct.	39,072	27,337	64,500
Nov.	46,994	33,764	62,750
11 mo.	382,725	258,93[2]	.....

INDEX OF FOUNDRY EQUIPMENT ORDERS

Foundry Trades Only

(Net Orders Closed, New Equipment)

	1953	1954
Jan.	99.6	173.8
Feb.	97.5	99.9
Mar.	132.2	82.7
Apr.	111.8	125.3
May	182.7	80.8
June	156.8	86.4
July	159.2	68.8
Aug.	236.3	75.6
Sept.	127.7	68.3
Oct.	87.2	147.5
Nov.	150.0	61.4
Dec.	161.2	....

Note: Figures are percentages of the base period 1947-49 taken as 100 per cent (monthly average). This is a new base period. Source: Foundry Equipment Manufacturers Association.

IRON AND STEEL SCRAP CONSUMPTION

(Gross tons*)

	All Scrap Total	By Types of Furnace: Cupola Total	By Types of Furnace: Air Total	By Types of Furnace: Electric Total
1952	61,625,549	9,154,146	1,053,233	8,015,064
1953				
Sept.	5,395,721	782,131	80,866	595,523
9 mo.	53,642,566	7,454,245	722,514	6,726,518
Oct.	5,628,568	779,444	75,618	566,878
Nov.	5,064,565	687,498	60,200	477,666
Dec.	4,690,277	755,276	68,002	442,818
Total	69,005,976	9,676,463	1,026,334	8,263,880
1954				
Jan.	4,574,384	711,335	71,202	505,536
Feb.	4,385,340	704,535	67,263	462,095
Mar.	4,637,573	783,529	82,337	517,702
Apr.	4,582,862	748,766	79,183	518,048
May	4,776,603	710,159	67,368	506,582
June	4,664,561	725,910	75,306	515,019
July	3,909,336	565,275	45,920	420,564
Aug.	4,164,703	671,631	65,336	486,596
Sept.	4,298,495	675,593	68,860	500,349
9 mo.	39,993,857	6,296,733	622,775	4,432,491

PIG IRON PRODUCTION AND CONSUMPTION

	Production** (standard grades—net tons) Total	Foundry	Malleable	Basic	Low Phos. Intermediate Low Phos. & Bessemer	Consumption* (By type of furnace—gross tons) Total	Cupola	Air	Electric
1952	61,306,723	2,864,722	3,013,267	48,253,390	7,175,344	61,550,961	5,438,294	449,646	118,820
1953									
Dec.	5,712,937	172,283	276,432	4,625,524	638,698	5,091,786	374,838	18,596	12,561
Total	74,879,511	2,599,307	3,736,431	60,465,016	8,347,825	66,637,364	4,918,480	272,311	164,267
1954									
Jan.	5,531,137	184,629	294,691	4,510,870	540,947	4,933,282	362,576	17,620	14,578
Feb.	4,764,613	156,178	272,707	3,911,670	424,058	4,293,942	351,824	17,257	9,892
Mar.	4,907,147	213,249	243,356	3,977,137	473,405	4,367,814	390,929	21,369	13,112
Apr.	4,449,289	155,249	256,662	3,630,901	406,477	4,021,957	375,045	26,553	10,497
May	4,572,252	154,768	231,479	3,741,671	444,334	4,188,269	367,437	16,453	16,531
June	4,683,629	175,759	200,154	3,853,444	454,272	4,297,531	375,601	18,545	14,196
July	4,590,076	182,130	182,527	3,790,999	434,420	3,990,431	293,926	12,258	13,317
Aug.	4,529,291	186,097	165,891	3,722,094	455,209	4,013,552	354,067	15,926	10,325
Sept.	4,417,888	188,599	179,629	3,622,799	426,861	4,005,578	346,698	16,984	11,654
Oct.	4,937,436	212,237	248,643	3,979,437	497,119	.....	.....	.....	.....
Nov.	5,204,446	202,824	263,484	4,233,253	504,885	.....	.....	.....	.....
Dec.	5,526,720	229,717	259,423	4,510,772	526,808	.....	.....	.....	.....
Total	58,113,924	2,241,436	2,798,646	47,485,047	5,587,465	.....	.....	.....	.....

*Source: U. S. Dept. of Interior. Bureau of Mines. **Source: American Iron & Steel Institute. [1]Source: Bureau of the Census. [2]For sale only.

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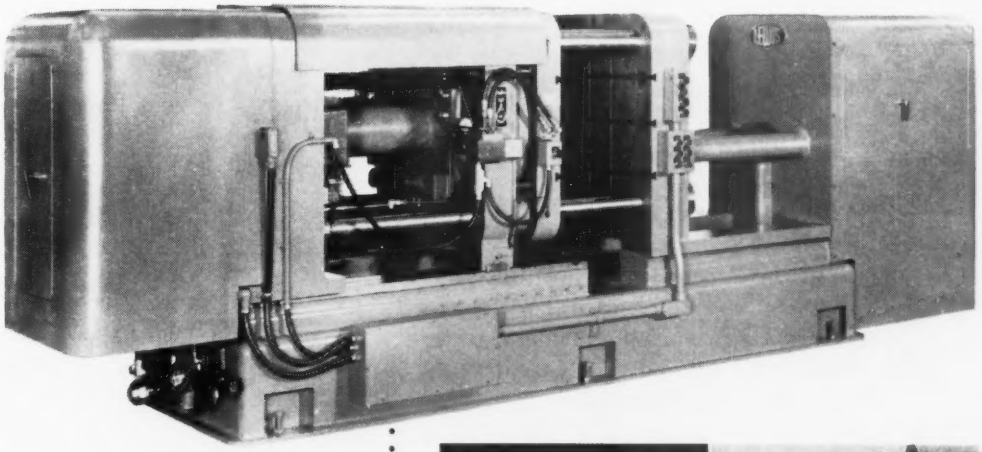
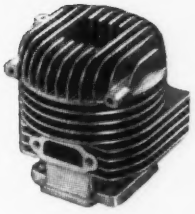
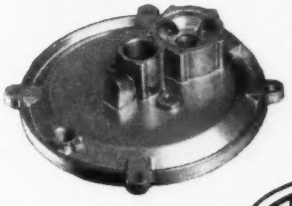
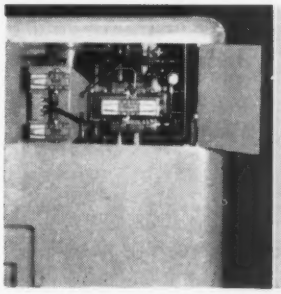
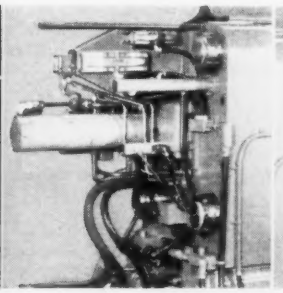




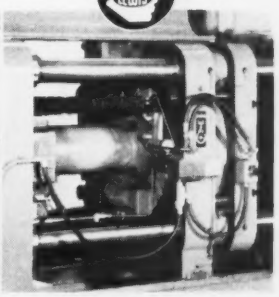




Variable two-stage injection system develops pressures up to 100,000 pounds to assure dense flawless castings. Access doors in detachable hood permit rapid adjustment.



All valves and cylinders for moving platen, clamp mechanism and sliding-block locking device are mounted in one location for fast, easy adjustment and maintenance.



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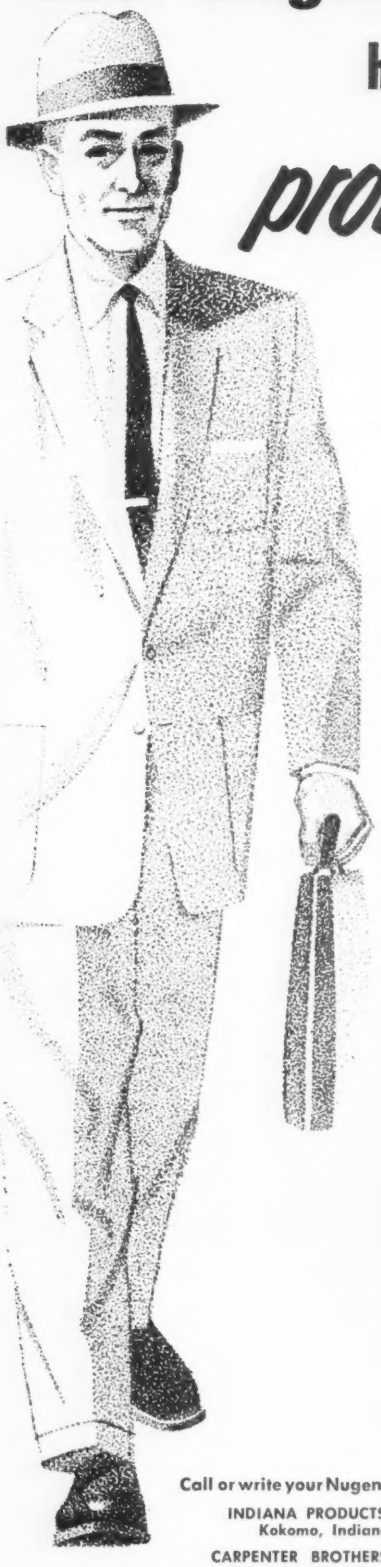

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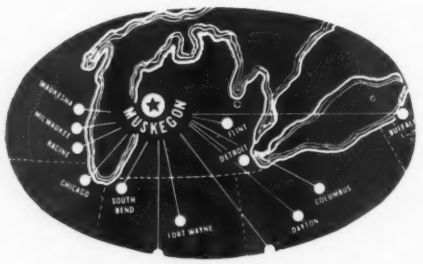

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Foundry Basement Damp? Here's How To Dry It

Simple Ventilation Makes Storage Space Available

By George P. Pearce

A LARGE basement under the molding area of a foundry was so damp that it could not be used for a storeroom, although more storage space was urgently needed. How to dry and properly ventilate the basement was the question. The plant engineer finally came up with an idea that seemed to have good possibilities; because it was inexpensive it was decided to try it.

The first step was to cut a 4 x 6-ft hole in the floor at the back of the core ovens on the ground floor and cover it with an open steel grid. This intake was at the far end of the basement. Then at the near end in the basement, an old reconditioned 30-in. direct-driven propeller type fan of 5000 cfm capacity was placed close to the floor. The fan sucked the air off the floor and delivered it through a 30-in. galvanized duct to the discharge end located in a corner of the foundry. The fan was wired in such a way that it would be started every time the basement lights were switched on and would run as long as they were in use.

GIVE

The basement was next cleaned, the cement walls and ceiling given a coat of white paint and the floor a coat of hard gray floor paint. The carpenters then installed bins and shelves and a small office for the records. All this preparatory work took about two months, since it was done at odd times, and during this period the ventilating fan was running almost continuously during the day time.

The first month no drying effect was noticed, the basement remaining

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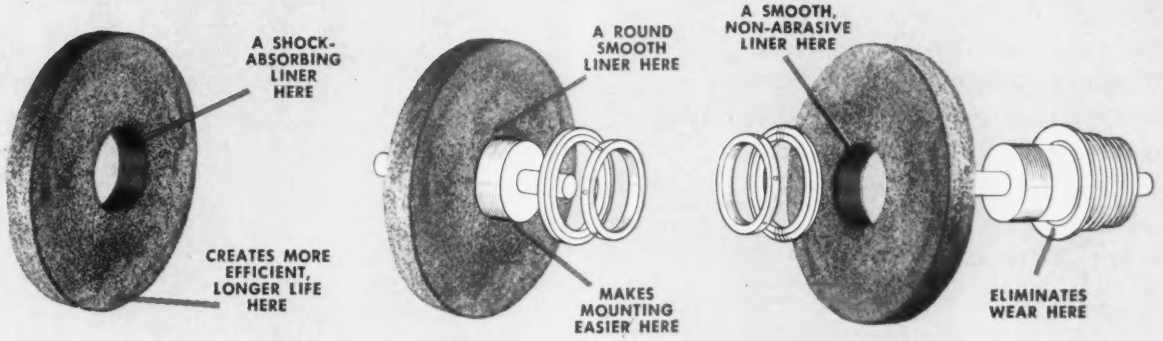
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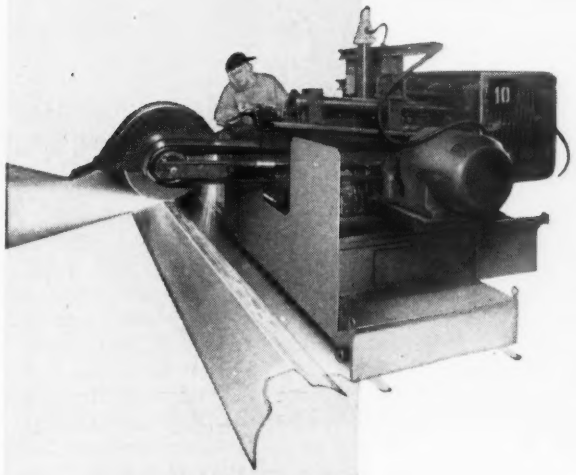

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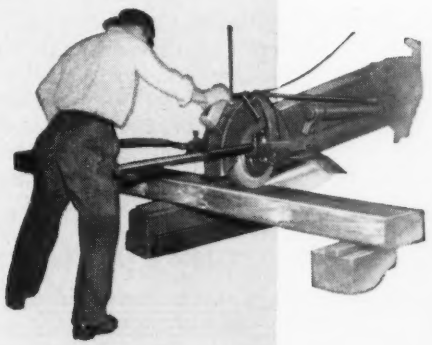

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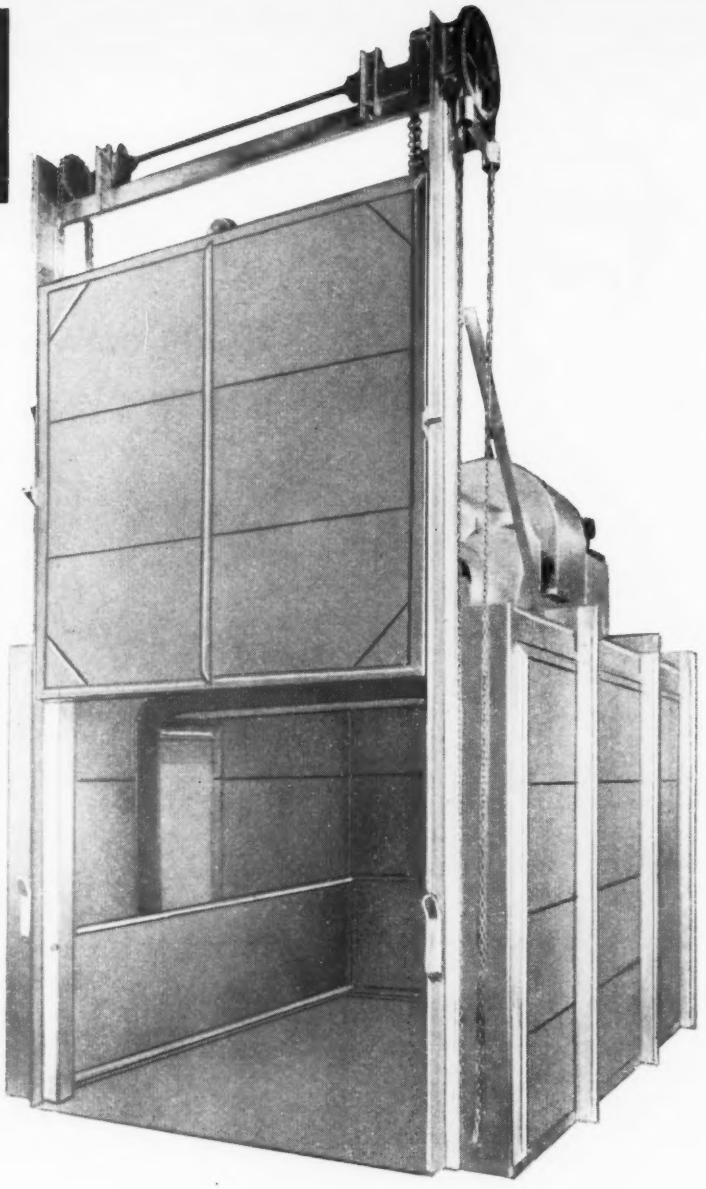

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at almost 100 per cent humidity. Success of the project was seriously questioned by the superintendent, for apparently nothing could be kept down there that would corrode, become moldy or otherwise be affected by the dampness. The following month, however, the basement became appreciably dryer; after three months it was quite dry and comfortable for the storekeeper, with no layer of cold damp air on the floor. The core oven room also was cooler.

All this was accomplished at practically no cost other than the running of a ½-horsepower motor.

ASTM Recommends Tentative Methods for Analysis

New tentative methods for chemical analysis and recommended practice have been issued by the American Society for Testing Materials, 1916 Race St., Philadelphia 3.

Tentative Methods of Chemical Analysis of Copper-Beryllium Alloys (E 106) provides analyses for the alloys covered by specifications B 194, B 196 and B 197. In Tentative Methods for Chemical Analysis of Ferro-Alloys (E 31) a procedure is given for silicon that is equivalent in accuracy and takes less time than present methods. Tentative Photometric Method for Determination of Manganese in Steel (E 30) is a more rapid alternate method for the determination of manganese in low-alloy, stainless and tungsten steels.

An explanation of the system used for designating tempers is given in Tentative Recommended Practice for Temper Designation of Light Metals and Alloys, Cast and Wrought (B 296). Information on melting ranges, pattern shrinkage allowance and foundry characteristics is given in the revision of Tentative Specifications for Magnesium-Base Alloy Sand Castings (B 80) and for Magnesium-Base Alloy Permanent Mold Castings (B 199). Alloy yield strength and new temper information are given in revisions of Tentative Specifications for Aluminum-Base Alloy Permanent Mold Castings (B 108) and Tentative Specifications for Aluminum-Base Alloy Sand Castings (B 26).

Film Gives Safety Pointers

Safe practices in the use of oxy-acetylene welding and cutting apparatus are shown in a new 20-minute slide film. The film, "The Guy Behind Your Back," makes its points forcefully so they will be remembered. The film is available from Air Reduction, 60 East 42nd St., New York 17.

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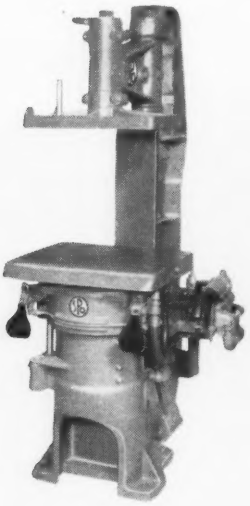

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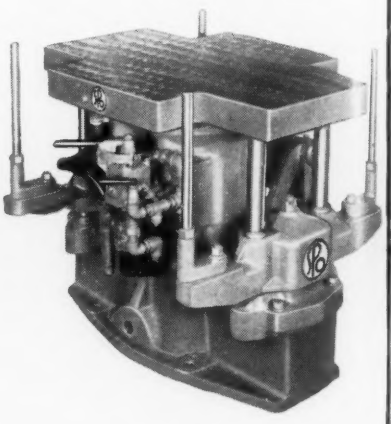

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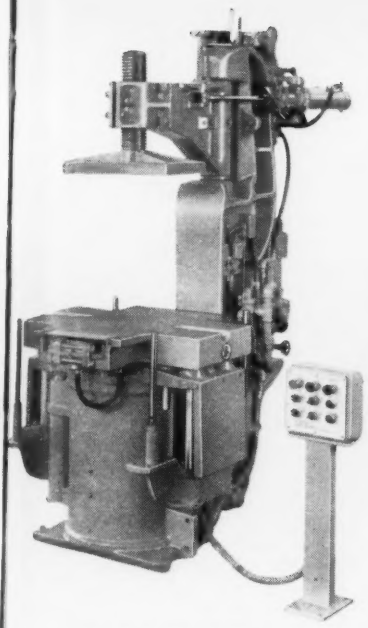

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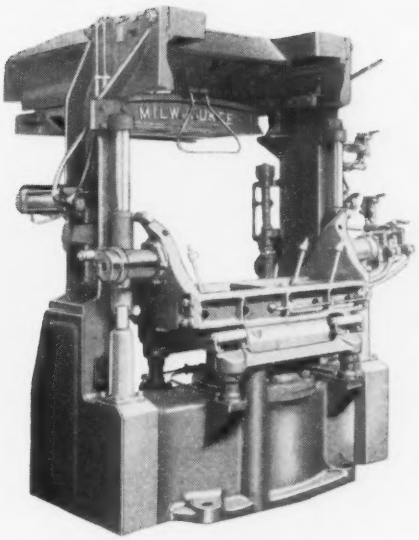

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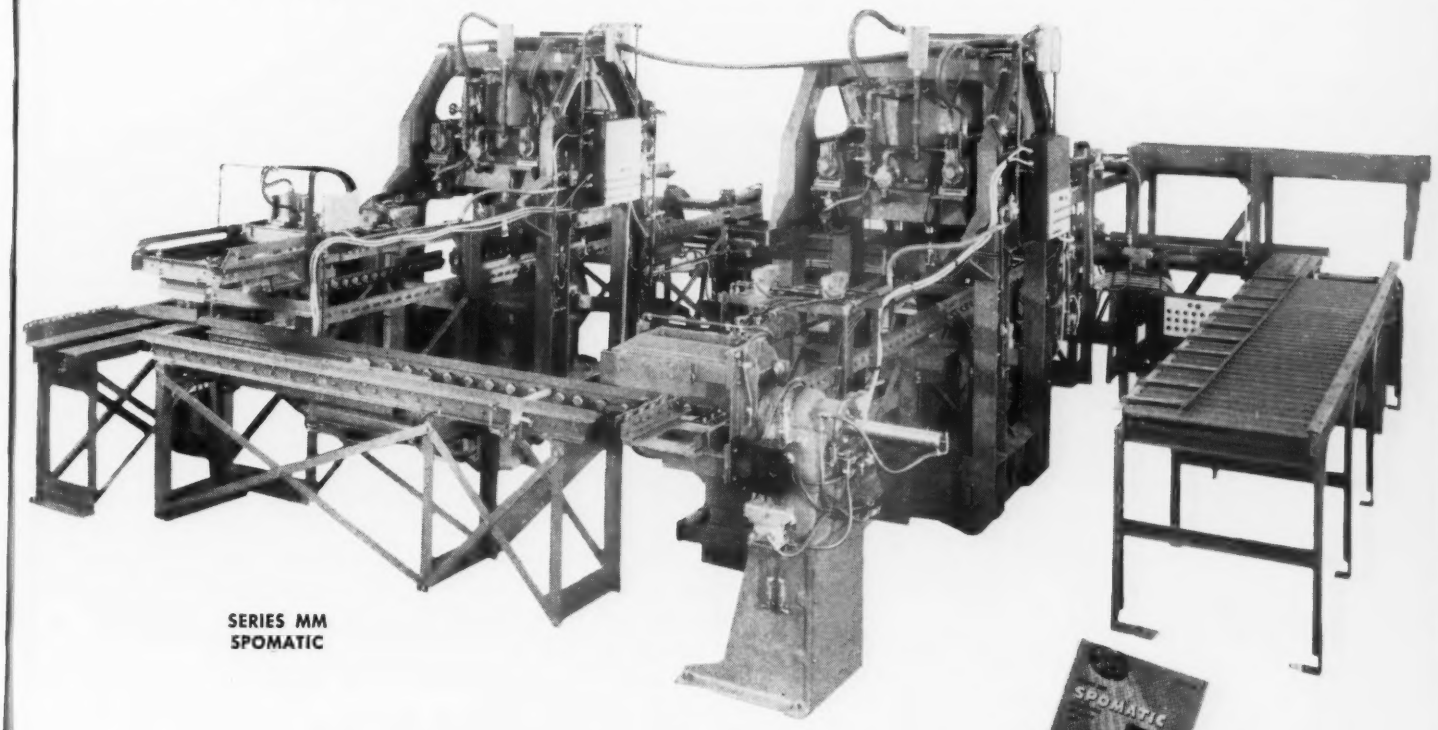
The importance . . . in fact, the necessity . . . of improving existing facilities is recognized by progressive foundrymen. In spite of the growing popularity of fully-automatic molding operations in large high-production foundries, the jobbing foundry will continue to pour tremendous annual tonnages with semi-automatic and manually operated molding machines. These foundries . . . to stay competitive . . . need machines of improved design that will produce precision molds for years with minimum maintenance and replacement. ONLY SPO has a complete line of performance-proven equipment to meet the needs of every jobbing foundry



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A Faster Method of

Manganese Bronze Analysis

By C. GOLDBERG
Chief Chemist
New England Smelting Works
West Springfield, Mass.

DURING 1950 a paper[1] by the author detailed a fast chemical analysis of manganese bronze for these elements—copper, tin, lead, manganese, iron, aluminum and nickel. Further experience with the system of analysis explained in that paper has continued to indicate that it is reliable as well as rapid. However, some improvements have become apparent and it is believed they will be of interest to other analysts.

Recent developments in alloy analysis have included a fast volumetric control method for tin[2] and a reliable colorimetric method for aluminum[3] that is free from interference due to the presence of iron. Although the author has pointed out[1] the advantages of a single sample method of manganese bronze analysis, time-studies have shown that when the tin and aluminum are separately determined by the methods given in the paper noted above the over-all length of time for complete analysis of manganese bronze is shortened considerably.

While the nitric acid solution of the sample is being boiled for 30 minutes to precipitate completely the tin as oxide, the fast volumetric method for tin may be run on a separate sample and completed within 15 minutes. The separate aluminum determination may be commenced, then, before the tin oxide filtration. After filtration, while the copper and lead are being electrodeposited, the aluminum determination may be finished before the electrolysis is complete. The filtrate from the electrolysis is used for the colorimetric determination of iron, nickel and managanese.

How To Proceed—The procedure for the tin assay is as follows: Transfer 1.0 gram of the sample to a 500-ml Erlenmeyer flask. Add 20 ml of c. p. concentrated hydrochloric acid, then 10 ml of 30 per cent hydrogen peroxide solution. After the strong reaction has subsided and the sample is completely dissolved, add 80 ml of 37.5 per cent hydrochloric acid solution. Then add 2 grams of sodium hypophosphite and a few small crystals of mercuric chloride to catalyze the tin reduction.

Bring the solution to a gentle boil and boil gently for several minutes or until the solution is clear. Insert into the mouth of the flask a vertical air trap filled with a cool, saturated solution of sodium bicarbonate and remove the assembly from the source of heat. Cool it under the faucet to 15° C or less. Remove the air trap, add a few marble chips to maintain a carbon dioxide atmosphere. Add 1 ml of starch solution as an indicator and 10 ml of 50 per cent c. p. ammonium thiocyanate solution to precipitate the copper as white cuprous thiocyanate.

Titrate the solution immediately to a blue end-point with standard iodine solution, prepared so as to have a factor approximating 0.05 per cent tin per ml. The iodine solution should be standardized from standard brass or manganese bronze samples. If there is reason to believe more than a trace of antimony is present add 0.5 gram of potassium iodide just before titrating. Thirty per cent hydrogen peroxide solution is a powerful, corrosive reagent and should be handled with care.

Aluminum Determination—To determine the aluminum colorimetrically a carefully prepared buffer solution must be used. It is prepared as follows: Transfer 500 grams of c. p. ammonium acetate to a 2-liter flask and add 1 liter of distilled water. Add slowly, with stirring, 80 ml of c. p. glacial acetic acid. Filter, if necessary. Dissolve 1 gram of "aluminon" (the ammonium salt of aurin tricarbonxylic acid) in 50 ml of distilled water and add it to the main solution. Dissolve 2 grams of benzoic acid in 20 ml of methanol and add it, while stirring, to the same solution to two liters.

Transfer 10 grams of gelatin to a 400-ml beaker and add 250 ml of distilled water. Place the beaker in boiling water and leave it until the gelatin is completely dissolved. Pour the warm gelatin into 500 ml of distilled water, while stirring. Cool to room temperature, dilute to 1 liter and mix well. Mix the "aluminon" and gelatin solutions together in a 4-liter amber bottle.

The aluminum assay procedure is simple and rapid. Transfer 0.2 gram of the sample to a 150-ml beaker and add 5 ml of c. p. concentrated hydrochloric acid and 5 ml 30 per cent hydrogen peroxide solution. Cover the beaker. When the solution is complete wash down the cover with a few drops of distilled water and boil down the solution to 2 ml to get rid of the excess peroxide. Transfer the solution to a 200-ml volumetric flask, dilute to the mark and mix well. Pipette 10 ml into a 100-ml volumetric flask. Add 2 ml of 4 per cent thioglycolic acid solution (freshly prepared each week). Shake. Add 5 ml of buffer solution and swirl the solution. Place the flask in boiling water and leave it there exactly 5 minutes.

Remove the flask and, after a moment, stopper it and cool to room temperature. Dilute to the mark with distilled water and mix well. Let it stand one to two minutes and read the absorbency of the solution in the colorimeter. A filter colorimeter is used here and readings are taken at 525 millimicrons.

Standard Curve — The standard aluminum curve is obtained as follows: Dissolve 20.0 milligrams of pure aluminum in 20 ml of c. p. concentrated hydrochloric acid (cover beaker) and warm gently. Wash down the cover and transfer to a 2-liter volumetric flask. Dilute to the mark and mix well. This solution contains 0.01 mg of aluminum per ml. Put from zero (to obtain the blank) to 8-ml portions of the standard solution in 1-ml increments into 100-ml volumetric flasks. Add to each flask 1 ml of copper chloride solution (1.35 grams of $CuCl_2$ in 100 ml distilled water). Dilute to 10 ml and add 2 ml 4 per cent thioglycolic acid solution. Shake. Add 15 ml of buffer solution. Then treat in the manner detailed above.

References

1. Goldberg, C., *Iron Age*, 166, 87, 1950.
2. Kinnunen, J. and Merikanto, B., *Chemist Analyst*, 41, 4, 1952.
3. Luke, C. L., and Braun, K. C., *Analytical Chemistry*, 24, 1120, 1952.

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*U. S. Pat. #2184926 (other patents pending)

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AROUND THE COUNTRY

NEWS REPORTS FROM

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Chicago— Many jobbing foundries in this area are handicapped in their operations by the short lead time their customers are giving them in ordering castings. All too frequently the buyer wants almost immediate delivery. For the foundry management, this makes for rough going. It confuses the purchasing of raw materials, the orderly scheduling of production, and sometimes even necessitates making special arrangements to deliver the work.

Orders for castings being what they are today, foundries find it expedient to carry minimum inventories of metallics and fuel. For nonferrous foundries, this involves metals and alloys, fluxes, etc.; for ferrous shops it embraces pig iron, scrap and coke.

Sellers of these materials have been doing relatively good business in the past few months. Spot orders throughout a month roll up into a satisfactory total at month end. But heading into a new month, these suppliers find few advance orders on their books and they find it difficult to do much forward scheduling.

Having low order backlogs, foundries are hard put to schedule their workers and their equipment to best advantage. Fluctuating production doesn't make for economical operations, yet the castings must be sold in a highly competitive market. As to deliveries, speedy need for the castings by customers sometimes necessitates truck hauling in place of usual freight shipment. Rush business always costs more to handle.

It is unfortunate, foundries and foundry suppliers maintain, that requirements for castings can't be ascertained further ahead and orders placed so as to allow reasonable lead time for normal processing of the work. Jobbing foundries are bearing the brunt of the unhappy condition and many are operating three to four days a week. They look with envy upon shops which serve the automotive industry. Currently, the latter are quite busy, working five and some even six days a week, and they are in a position to benefit from planned production.

* * *

IT ISN'T new for foundries to suffer losses from thefts. Nonferrous shops which use relatively high-priced metals and alloys frequently are robbed of them despite care taken in storage. It is a little unusual to have metal patterns stolen, however, simply for the value of the metal as scrap.

But such a situation recently occurred in Milwaukee. A laborer was apprehended for stealing $15,000 worth of metal master patterns which he allegedly broke up and sold to scrap dealers for $40. The patterns were used in production of chain links. When arrested, the worker was carrying in his pockets 24 pounds of lead from broken patterns. The company estimated that 100 patterns had been destroyed in a six-month period and that it would take patternmakers six months to replace them.

Washington—The long-discussed question as to whether an expansion in capacity is needed to fill the requirements for large steel castings in event of another all-out war mobilization may be headed for a showdown. The industry task group appointed to consider this question and come up with recommendations is to be called into a meeting in Washington shortly to go over data now being compiled. This, on the one hand, shows present capacity, and its locations, and, on the other, gives rough estimates as to military and defense-supporting requirements.

The task group comprises: A M. Andorn, chairman and president, Penn Steel Casting Co., Chester, Pa.; K. C. Gardner Jr., executive vice president, United Engineering & Foundry Co., Pittsburgh; M. G. Sternberg, president, Continental Foundry & Machine Co., Chicago; S. J. Moran, vice president and general manager, Union Steel Castings Division, Blaw-Knox Co., Pittsburgh; W. B. Reed, General Steel Casting Co., Eddystone, Pa.; W. L. Schneider, vice president, Falk Corp., Milwaukee.

New York—Gray iron foundry business is at least holding its own. But there is no pronounced improvement and operators generally are disappointed over the trend so far this year. With few exceptions operations are not running over four days a week, and in general the average appears to be between three and four days a week. Foundries supplying construction requirements are faring the best.

Steel foundry operations are not much better than those of gray iron shops. Malleable production is being sustained primarily by a brisk demand for pipe fittings, with operations running close to five days a week and backlogs averaging four to five weeks.

Brass and bronze jobbers report business as spotty, although they are receiving an increasing overflow of work from captive shops engaged in the manufacture of meters and plumbing fixtures, a situation that reflects a rather high level of building construction. On the other hand, shops engaged in production of valves and pumps required for the oil industry and for oil and gas lines, find the going rather slow; and those engaged primarily in shipyard requirements complain of a spotty and generally sluggish demand. However, at least one large manufacturer of maritime specialties has noted a definite pickup recently, apparently for government work.

Aluminum foundries engaged in aircraft and radar needs are active; those otherwise engaged are having their difficulties maintaining even a fair rate of operation.

Philadelphia—Gray iron jobbing foundry operators are somewhat encouraged. Business is still far from brisk, but there has been a consistent gain in bookings the last few weeks. Operations range four to five days a week, and backlogs two to three weeks. Textile machinery requirements are somewhat better, and there is a fairly satisfactory demand for building needs, which is expected to increase as the spring season draws near. Pressure pipe shops have been busy throughout the winter.

Steel casting demand shows some buoyancy, but not much. Most plants are operating five days a week, but with reduced working forces, and backlogs average around four weeks, little different than a month ago. Dodge Steel Co., Tacony, Philadelphia, manufacturer of electric furnace steel castings, has been acquired by the South Chester Tube Co., Chester, Pa. However, it will be operated as a separate unit and under its own

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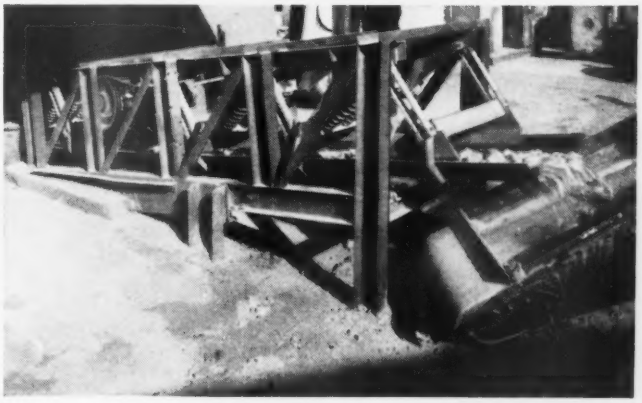

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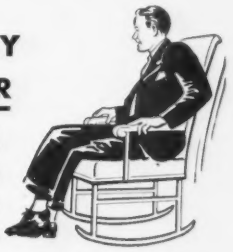

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Malleable shops report continued good demand for pipe fittings and some pickup in specifications from agricultural equipment manufacturers. Railroad business is spotty. However, most shops are working five days a week and have fairly comfortable backlogs.

Brass and bronze shops are experiencing a good demand for plumbing fixtures, but report a continued lag in maritime requirements. Some captive shops are running better than independent plants, due particularly to their tie-in with the plumbing field. The light metal shops engaged in aircraft and radar needs are operating at capacity and, while backlogs are not as extended as they were some months ago, they nevertheless are providing operators with a comfortable cushion of business.

Los Angeles—February was 10 per cent better than January for most steel foundries, and foundrymen are generally well satisfied with the current level of sales activity. Nonferrous shops reported smaller gains but on the average their business was better too.

Trade observers expect slight increases in ferrous casting prices when union contracts are reopened. Although many shops won't sit down with union heads until June, some of the large steel foundries in this district will negotiate in the spring. Union demands are not expected to be exorbitant, and price advances will be slight, foundrymen feel.

Foundry melting rates average 90 per cent in most steel shops, slightly lower for the nonferrous foundries. Five-day work weeks are now standard, with some overtime reported by busy shops.

Backlogs extend to six weeks for some foundries, and as far as eight weeks on special jobs.

Supplies of foundry scrap remain plentiful, with foundries limiting purchases to immediate needs. During late 1954 foundries increased scrap purchases to build up inventories.

Foundrymen note that continued high activity in West coast aircraft plants has increased orders for castings for new aircraft designs. Stepped-up orders from planemakers have boosted sales volume for magnesium foundries more than 10 per cent since the start of the year. Magnesium foundries report their defense sales exceed 60 per cent of their total output, but commercial activity is still high, they say.

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Additional Nonferrous Casting Clinics Are To Be Held

Nonferrous metals casting clinics in various parts of the country are planned by Federated Metals Division, American Smelting & Refining Co., 120 Broadway, New York 5. The company's first nonferrous clinic was held in October at the New Jersey laboratories of the company. Over 85 foundrymen attended the first clinic and participated in forums discussing melting, gating, risering, pouring, analysis of defects and gases in metals.

Statistics On Injuries Are Compiled by Revised Method

A revised method of compiling statistics on injuries received in industry has been developed by the American Standards Association, 70 East 45th St., New York. Much of the revision is a clarification of the 1945 standard which has been used by the National Safety Council, the Bureau of Labor Statistics and industrial corporations to measure and record ac-

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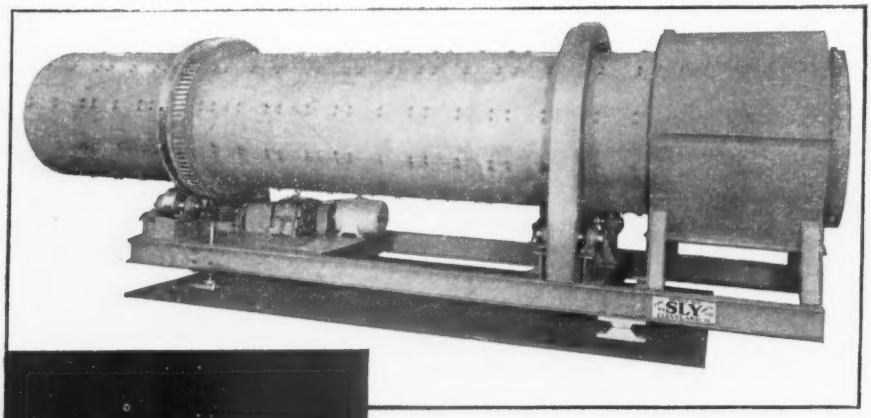
cidents. The National Safety Council put the new standard into effect Jan. 1, 1955.

Ductile Iron Conferences Are Held by International Nickel

Educational conferences to acquaint engineers with the properties and applications of ductile iron are being held in various areas of the United States by International Nickel Co. Discussion at the conferences centers on the mechanical properties, design, manufacturing, specifications, heat treatment, applications and service performance of ductile iron.

Individual meetings, attended by design engineers, metallurgists, materials engineers, purchasing agents and representatives of management, have been arranged for companies employing cast or wrought components. Companies wishing to schedule meetings on ductile iron should communicate with the Development & Research Division, International Nickel Co., 67 Wall St., New York 5.



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Foundries are again recognizing the advantages of continuous tumbling with its lower unit cost.

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Foundry Capital Expenditures Show Slight Drop for 1953

Foundry expenditures in 1953 for new structures, plant additions, new machinery and equipment lagged slightly behind the rate for all manufacturers. A recent report by the Bureau of the Census shows that industry as a whole spent $7½ billion for these facilities in both 1953 and 1952. Spending by foundries dropped from $118 million in 1952 to $114 million in 1953.

Ferrous foundries accounted for all of the decrease, and the drop was entirely in expenditures on new structures and additions—from $33 million in 1952 to $29 million in 1953. Approximately $85 million was spent in both 1952 and 1953 for new equipment.

Ferrous foundries showed decreases in expenditures for both plants and equipment: $27 million for plants and $71 million for equipment in 1952 and $19½ million and $63 million, respectively, in 1953. On the other hand, nonferrous foundries boosted their equipment expenditures from $14 million in 1952 to $22 million in 1953 and their spending on plants from less than $8 million to nearly $10 million.

None of these figures includes federal expenditures for manufacturing facilities leased to private companies. Also, they apply only to plants that were in operation at least part of the year.

Here's how these capital expenditures by foundries and all manufacturers compare for other years (figures in millions of dollars):

	Foundries	All Industries
1947	95	6000
1949	58	5100
1950	70	5100
1951	168	7200
1952	118	7500
1953	114	7500

Copies of the 1953 survey can be obtained from the Bureau of the Census, Washington 25, for 10 cents.

New Job Directory Published

New job directory for engineers has been published by Decision Inc., 105 East Fourth St., Cincinnati 2. It gives information on 129 companies, their products, number of employees and whom to contact. An index section indicates the type of engineers wanted and locations by cities and states. Engineers' Job Directory is being distributed to over 140 accredited engineering colleges and universities. Copies may be obtained for $2.25.

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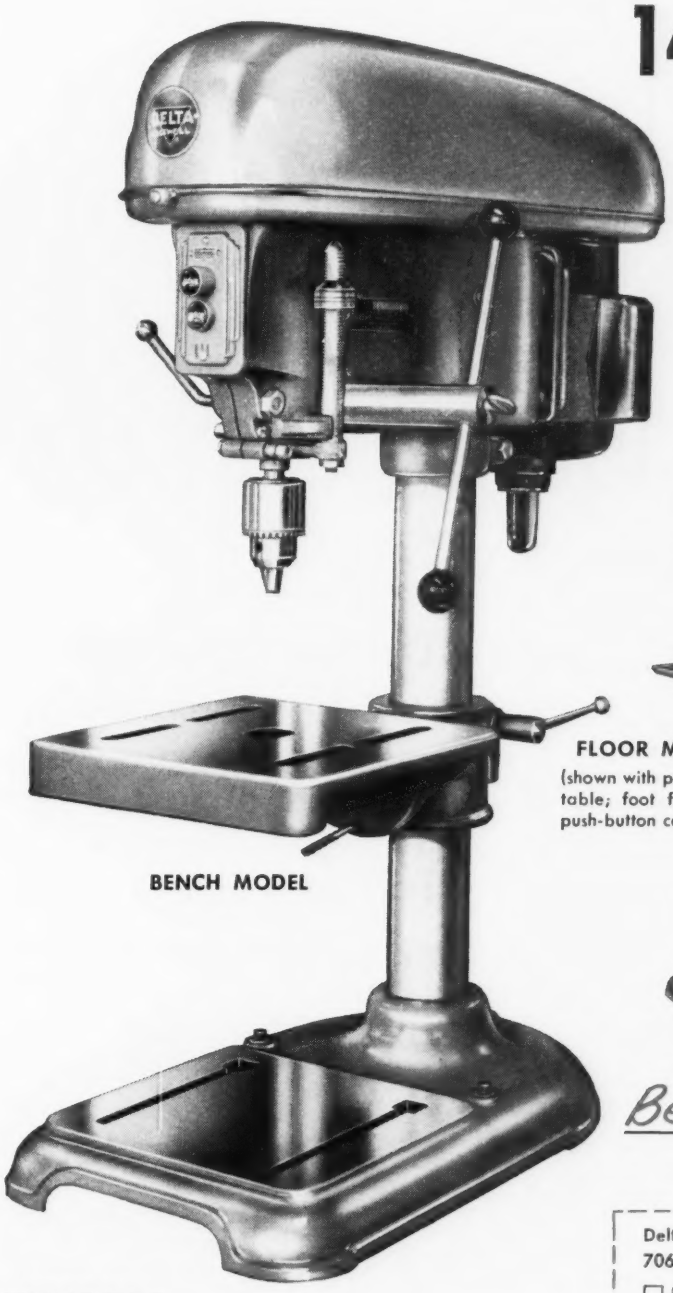
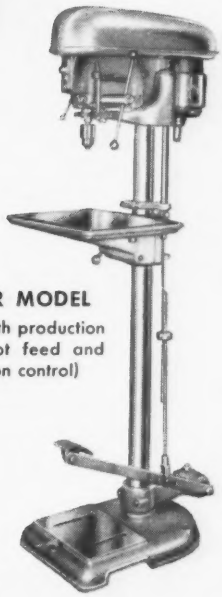


BENCH MODEL



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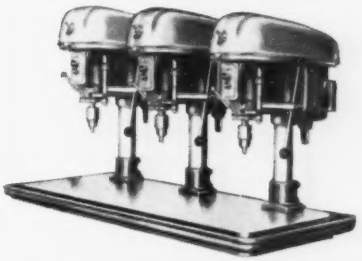

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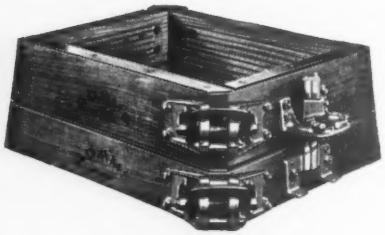

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OBITUARY

WILLIAM S. GOULD, 80, former board chairman, Lancaster Malleable & Steel Corp., Lancaster, N. Y., died Jan. 2. The company recently discontinued operations. A son of the founder of Gould Coupler Co. and Gould Storage Battery Co., Depew, N. Y., Mr. Gould was president of the two companies until they became Symington-Gould Corp., and Gould National Storage Battery Co.

* * *

John J. Cadot, 65, since 1953 executive vice president, Hardinge Co. Inc., York, Pa., died Jan. 19. A graduate of Colorado School of Mines he was in charge of manufacturing operations for the company in Denver until 1920, when he was transferred to York. He subsequently served as works manager, vice president and treasurer.

* * *

Samuel Mairs, 75, chairman of the board of directors, Archer-Daniels-Midland Co., Minneapolis, died Jan. 17. For 51 years he was associated with the present company and its predecessors, Daniels Linseed Co., and Archer-Daniels-Linseed Co. He was named board chairman in 1947.

* * *

Clyde E. Hopping, 68, chairman of the board of directors, Alhambra Foundry Co., Alhambra, Calif., died Jan. 5. With his father, the late Frank A. Hopping, he founded the company in 1923, and was its president from 1936 until last year.

* * *

Charles S. Muir, 74, director, and former vice president-sales manager, Palmyra Foundry Co., Palmyra, N. J., died Jan. 14. When he retired 5 years ago he had been associated with the company 27 years. He was previously employed by Fletcher Works Inc., Philadelphia.

* * *

John C. Cox, 49, president, Cox-Ware Corp., St. Louis, died Jan. 22. A graduate of Washington University, he founded the aluminum castings company in 1948.

* * *

Ralph R. Belleville, 67, sales representative, Crucible and Refractories Division, Joseph Dixon Crucible Co., Jersey City, N. J., died Feb. 6. He joined the company in 1905.

* * *

Ralph H. John, 58, chief engineer, Chevrolet-Saginaw Grey Iron Foundry Division, General Motors Corp., Waukegan, Ill., died Jan. 12.

* * *

Franklin C. Yarger, 50, chief of production planning, Castings and Forgings Division, Aluminum Co. of America, Pittsburgh, died Jan. 18. He joined the company's Cleveland plant in 1942 and went to Pittsburgh in 1947.

* * *

William C. Pyott Sr., 84, former secretary-treasurer, Pyott Foundry & Machine Co., Chicago, died Feb. 7. Mr. Pyott retired in 1928.

* * *

Henry J. Mittelstaedt, sales manager, Hanna Furnace Corp., Buffalo, subsidiary of National Steel Corp., Pittsbrugh, died Jan. 13. He joined Hanna in 1913 as a salesman and became sales manager in 1954.

* * *

Frank Travis Sr., owner, D. W. Travis Sons, Athens, N. Y., died Jan. 10.

Book Review

ASTM Standards on Copper and Copper Alloys, paper, 609 pages, 6 x 9 in., published by the American Society for Testing Materials, 1916 Race St., Philadelphia 3. Price $5.

Contains in their latest form 123 ASTM standards pertaining to copper and copper alloys. Standards cover specifications for electrical conductors, plate, sheet, rolled bar and strip, sand and die castings, ingot, wire, pipe and tube, filler metal and method of tests for copper and copper alloys.

Book Covers Lighting Units

Complete compilation of standard specifications for industrial lighting units is now being printed. The book covers 46 different types and sizes on incandescent and fluorescent industrial lighting units. Advance registrations for copies of the new 1955 RLM Specifications book are being accepted by the RLM Standards Institute, Suite 818, 326 West Madison St., Chicago 6.

Charles Edgar Hoyt, Former Head of AFS, Dies

CHARLES EDGAR HOYT, 85, former executive vice president and treasurer, American Foundrymen's Society, and for many years one of the best known and highly respected individuals in the foundry and allied industries, died Jan. 29 in Oak Park, Ill. Mr Hoyt entered

the castings industry in Wayland, Mich., his birthplace, where he was associated with his father in operating a foundry and machine shop. Later he taught foundry practice at Michigan State College and the former Lewis Institute, Chicago.

In Chicago Mr. Hoyt took an active part in association work as a member of the Western Foundrymen's Association, and as secretary-treasurer of the Chicago Foundry Foremen's Association. Later he was elected secretary of the Associated Foundry Foremen of America, and secretary and manager of exhibits of the Foundry Supply Association and its successor, the Foundry & Machine Exhibition Co.

When the American Foundrymen's Association was incorporated in 1916, Mr. Hoyt was elected director and manager of exhibits. In 1918 he became secretary-treasurer of the association and in 1926, executive secretary-treasurer and manager of exhibits. When the office of executive vice president was created in 1936, Mr. Hoyt was elected to that position, and after relinquishing this office in 1941, he continued as convention and exhibit manager. The latter title was vacated in 1943 and he was made treasurer, holding the office until the time he retired, in 1946.

In 1941 Mr. Hoyt was awarded the Joseph S. Seaman Gold Medal of the American Foundrymen's Association for outstanding service to the foundry industry. In 1946 the association's foundation lecture was renamed the Charles Edgar Hoyt Annual Lecture, honoring his long and valued service to the foundry industry and the association.

Mr. Hoyt is survived by his widow, Mrs. Jennie Reininga Hoyt, formerly assistant treasurer, American Foundrymen's Association.

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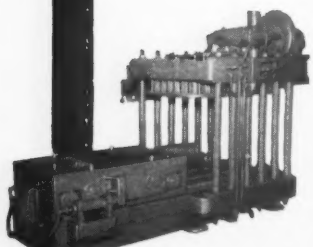

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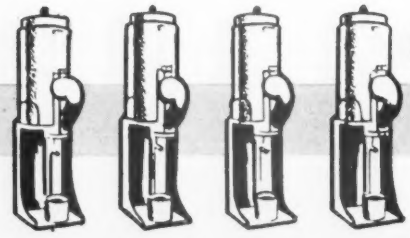

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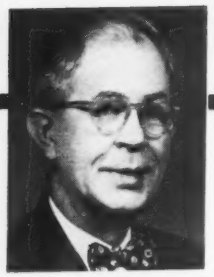

MAN-TO-MAN

By RALPH L. LEE

The American Society of Mighty Foundry Midgets

"The little jobbing foundries tucked away in side streets and back alleys are not just hillbilly poor relatives of mechanized plants"

I IMAGINE that almost every foundryman, at some time or other, has felt it his duty to point out to nonfoundrymen how helpless they and everyone else would be without castings. Time and again I've gotten quite a rise out of some layman by asking him. "Do you realize that everything you've got on this minute —in fact, everything you own— either started out with a casting or required the use of a casting some place in its manufacture?"

I keep thinking of the first step in the making of practically every article—the experimental model, calling for one or two first and last-time castings, single castings for jigs, fixtures, dies or parts of the complicated automatic setups.

Looking down the new automatic motor block machining line at the Pontiac Motor plant the other day, I couldn't help thinking of all the patterns that had to be made and cast just once to go into that automation marvel. Then a thought occurred to me. If, as we frequently hear it said, the old journeyman molder (the all around man) is practically extinct, where in the heck are all these single production castings coming from? Someone had to make them, and you can bet your sweet life they weren't made by pushing buttons.

Somebody had to take loose patterns, figure out how to put them in the sand, ram them up by hand, hand cut and tool the parting line, runners and gates and either pour them or see to the pouring. In spite of our increased tooling programs, expanding manufacturing facilities, to say nothing of research and model building galore, there doesn't seem to be much chance of anyone's inventing an electronic marvel into which you can feed a blueprint and have a casting drop out.

So it just seems to me that the little jobbing foundries tucked away in the side streets and alleys of our great industrial centers are not just hillbilly poor relatives of the great big mechanized marvels. In my book these single-time pattern molders are just as much a part of this automatically mechanized shop age as the electronic eye. They should not be looked upon by themselves or others as scavengers sweating out a meager living on the crumbs and scraps the big fellows will not fool around with.

Some time back I made up my mind to spend all of my foundry visiting time in little foundries, not as a compliment to them, Heaven forbid, but to find out how they get along now that the master molders of the past have become extinct.

I thought I'd start near home, by looking in the classified section of the telephone book for a little foundry I had borrowed some sand from over 15 years ago. I'd forgotten its name. So I couldn't look it up in the main section. I had one heck of a time sleuthing around with the suspicion that they'd folded up.

Finally I got hold of the name and found the company very much in business. In fact, it had moved to bigger and better quarters and was happy to have me come to visit. The firm name was in the telephone directory, all right, but not in the classified section.

It was the first foundry I had ever been in that used patterns which had not been shellacked or lacquered or where even deep draws were made without a smidgeon of draft. The molders laid up slabs of core stock against the patterns before they rammed them up. The core slabs came to the molders just like lumber of different thicknesses, which they sawed and filed to fit.

All their sand (naturally bonded —rather coarse to me) was tempered and cut by hand by each molder or his helper. They had considered a sandslinger and concluded it wouldn't pay with their kind of work, but they were toying around with other ideas on the sand subject. They had two electric cranes, one on the light side and the other quite hefty. I don't see how they could have managed without them, for some of their castings weighed close to 8 tons.

Out of 22 or 23 employees, two were of the old school and worked off and on, but most of the molds were made by boys who had come in as helpers, with no previous experience, and had learned how to mold from watching others on the job. Although I don't suppose they could go into any foundry in the country and tackle every kind of work, they have the hang of the kind of work their shop does, and I imagine they can do it just as well as any journeyman who might drop in.

There were two cupolas, one in operation more than the other. Both were needed every once in a while for bigger jobs. Up on the charging floor, where I climbed on a spindly little iron ladder, the foreman explained rather apologetically that, following the custom of the old man (the founder), they never weighed their charges, but used good coke, scrap and pig and rarely had any complaints on their iron.

We talked a little about simple chill tests, although I was pretty cagey about experting away from home. By the way, the shell of the original cupola, which the old man made by hand, was still out in the yard. I went out to see it, and found it to be not much larger than the Lee Hobby Foundry's (around 18 in. ID). That little cupola built the business, the young man told me.

I couldn't resist taking a sample of sand from one of the heaps home with me. Ran it through my new Lee sand strength tester and phoned back the results and think we started something. The special purpose flasks out in the yard covered more territory than the foundry proper. I didn't measure, but that's the way it looked.

There was a little foundry operating 180 degrees around from mechanization, automation, scientific control and so forth, yet turning out castings exclusively for the most highly mechanized manufacturing operations in the world. At first glance and in the light of scientific progress

Pouring magnesium at Superb Light Alloys Inc., Farmingdale, N. Y.

...WITH *Borden's new* Shell Mold Resin

To meet the demand for high dimensional stability and smooth finish in magnesium castings of high-fidelity pickup arms . . . The Superb Light Alloys Inc. decided to use the modern shell mold process.

Then—to help form the best shell molds possible for their casting . . . these progressive foundry operators selected Borden's new THOR MCF-7 resin.

That's because THOR MCF-7 assures a full thickness build-up—even on regular and vertical pattern surfaces. It produces a flat, rigid shell without warpage. And it strips off the pattern cleanly and easily.

Perhaps Borden's THOR MCF-7 resin in your shell mold process can help increase your production and solve many of your casting problems. If you'd like a trial run—have a Borden technical expert assist you. Write The Borden Company, Chemical Division, Dept. F-35, 350 Madison Ave., New York 17, N. Y.

UREA AND PHENOLIC RESIN CORE BINDERS * SHELL MOLD RESINS * CORE SPRAY * CORE PASTE * PARTING AGENTS

Magnesium pickup arms and section of shell mold showing exceptional smoothness and dimensional accuracy.

FOUNDRY RESINS

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THE *Borden* COMPANY

CHEMICAL DIVISION

HEAT TREATING TECHNIQUES IMPROVED AT RIVERSIDE FOUNDRY

Illustrated above is the Hevi Duty Furnace used to determine heat treating procedure and the metallurgical characteristics of new alloys or special steels, at Riverside Foundry in Bettendorf, Iowa. The establishment of the proper time and temperature cycles for the treating of various castings has increased production while reducing rejects.

Engineered features that produce the heat treating results you want

Only Hevi Duty Furnaces assure uniform temperature with the long life "Return Bend" heating elements that radiate the heat from the six sides of the work chamber. Ceramic refractories rigidly support the round rod elements which have proven durable under the most severe operating conditions. Because the Return Bend Elements have less surface area per cross-section to oxidize or deteriorate, element life is greatly increased.

There is a Hevi Duty Furnace in the size, type, and temperature range to handle your most critical type of heat treating. Tell us about your requirements.

Write for Bulletin 441.

HEVI DUTY ELECTRIC COMPANY

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Heat Treating Furnaces... Electric Exclusively

Dry Type Transformers *Constant Current Regulators*

and developments, they might appear to be backward or old-fashioned, but they had developed a highly specialized jobbing technique just as important to surrounding industry as many of the developments from the science lab.

They made their own molders out of helpers and adjusted process to fit the special need of their customers. Whereas the quantity production foundries can experiment around with a pattern as many times as they need to get what they want, these boys have to make the grade the first time. They have too much iron and labor in each job to miss the boat too often; they have to do the job the first time.

As president of one of the smallest foundries in the country, I think we're going to organize sort of a brotherhood, association or what have you. We'll call it the A. S. M. F. M.—The American Society of Mighty Foundry Midgets. Only foundries with 25 employees or less will be eligible. We'll gather together not too regularly and discuss problems, methods and ways and means peculiar to the size of our operations. We'll beat the old tom-tom to attract more attention from the rest of the industry, including the press, technical associations, suppliers and what have you. We will fight for recognition and respect as a class apart from the common run of big operators.

The first meeting will be held within the very near future in the Lee Hobby Foundry, with the general manager, the general office manager and the general foreman of the foundry I've been talking about as our honored guests. I've already discussed the matter with the chairman of our board, Mrs. Lee (That's Mother, my home superintendent), and she said "If you're going to feed them why don't you cook the meal yourself? They'd enjoy it." So we'll have Ralph Lee's famous iron puddler's stew, garlic bread, plenty of good hot coffee and canned cherries. (Mother said she'd be glad to help.)

With no formal program, we'll just talk shop—*little shop*, that is.

Veteran Foundrymen Retire

Retirement of 23 veteran employees whose combined service records total more than 826 years of employment has been announced by the Seymour Mfg. Co., Seymour, Conn. The longest term of service is that of Albert Maybury who worked for over 63 years with the company. He started with the company in 1891 and learned secrets of the trade from his father and his uncle.

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Test after test shows YELLOWSTONE BENTONITE to be the best foundry bentonite

In test after test, Yellowstone Bentonite proved the best! Here are results of a report made by an independent research laboratory (name furnished on request). Yellowstone was tested and compared with three other commercial western bentonites. Common testing procedures were those recommended by the American Foundrymen's Society.

- ★ **Yellowstone produced highest green strength.**
- ★ **Yellowstone produced highest green permeability under all conditions.**
- ★ **Yellowstone had the highest green toughness.**
- ★ **Yellowstone was the most durable of the western bentonites.**
- ★ **Yellowstone was above the average of the bentonites tested in dry compressive strength.**
- ★ **Yellowstone produced better surface finish than other bentonites.**

For quality, maximum economy, and assured uniformity every time, ask your distributor for Yellowstone Foundry Bentonite. It's the best bentonite on the market.

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Houston, Texas

Coming in May ... 1955 PRE-CONVENTION ISSUE.

SPECIAL EDITORIAL REPORT

Foundry Processes

IN FIVE PARTS

• To appear complete in the May Pre-Convention issue of FOUNDRY—*another editorial-plus feature* at convention-time. This year's special report will describe new developments and trends in these five categories:

1. **MOLDING**—Shell, Pressure, Investment, Plaster, Centrifugal, Permanent, Die Casting, Gating and other related subjects.
2. **MELTING**—Basic Cupola, Hot Blast, Induction and Vacuum.
3. **METALS**—Pearlitic Malleable, Nodular, High Alloy, Bronzes, Aluminum, Magnesium, Titanium.
4. **TESTING**—X-Ray, Magnaflux and Gamma Ray testing of metals, Sand testing.
5. **HEAT TREATMENT**—Malleable, Steel, Gray Iron and Nonferrous castings.

Leading authorities who are well qualified to discuss their subjects from a practical as well as technical foundry "slant" have been asked to prepare reports for this special editorial feature—their 27-plus discussions will constitute an important contribution to foundry "know-how" at this time.

This Issue Will Also Feature

THE CONVENTION PROGRAM and full detail on the Houston meeting (59th annual convention of the American Foundrymen's Society, May 23-27, 1955).

A PENTON PUBLICATION

PENTON BUILDING • CLEVELAND 13, OHIO

Leaders Elected for Material Handling Education Committee

Prof. Byron W. Saunders has been elected chairman of the College-Industry Committee on Material Handling Education for 1955. Headquarters for the committee is in Chicago.

PROF. SAUNDERS

The new chairman is associate professor at Cornell University's Sibley School of Mechanical Engineering. Prof. Saunders is responsible for courses in production engineering which includes process planning, material handling, plant layout, cost analysis and economic analysis.

Objectives of the committee include making available material for use in courses on material handling, developing principles of material handling organization and management and encouraging material handling research.

Assisting in the direction of the committee are two vice chairmen, Howard M. Palmer, vice president of Lewis-Shepard Products Inc., and George A. Smith, manager of material handling for International Business Machines Corp.

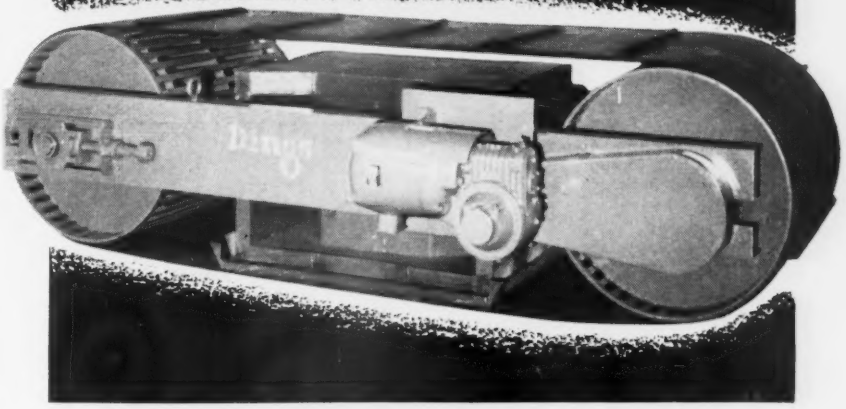
Industrial Management Society Publishes Clinic Proceedings

Proceedings of the 18th Annual National Time and Motion Study and Management Clinic sponsored by the Industrial Management Society and held in Chicago during November are available. Talks of leaders of labor, management and government on various topics including time study, motion economy, methods, plant layout, cost controls, incentives, job evaluation and human relations are combined with charts, forms and illustrations in the 176-page publication. Copies are available for $5 from the Industrial Management Society, 35 East Wacker Dr., Chicago 1.

AIEE Will Discuss Cranes

Electrical overhead cranes will be the subject of a technical conference of the American Institute of Electrical Engineers at Cleveland Hotel, Cleveland, Mar. 28-29. Sessions on overhead traveling cranes, grab buckets and crane collector systems are included in the program.

Here's Positive Self-Cleaning
TRAMP IRON PROTECTION



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● DINGS *IN-LINE* RECTANGULAR SELF-CLEANING MAGNETS pull tramp iron of any shape out of belt or oscillating conveyor burdens traveling at any speed. They do the job where even the largest diameter magnetic pulley would fail—where burden trajectories are almost horizontal.

● Iron extraction with the Dings IN-LINE is parallel to burden travel and at the same speed. That's why this magnet can handle tramp iron such as long iron rods with ease.

● The IN-LINE is a self-cleaning version of the Dings RM rectangular magnet—the most efficient ever designed for removing tramp iron from conveyor belt burdens. Available in standard sizes to meet almost any belt speed, width or burden characteristic requirements.

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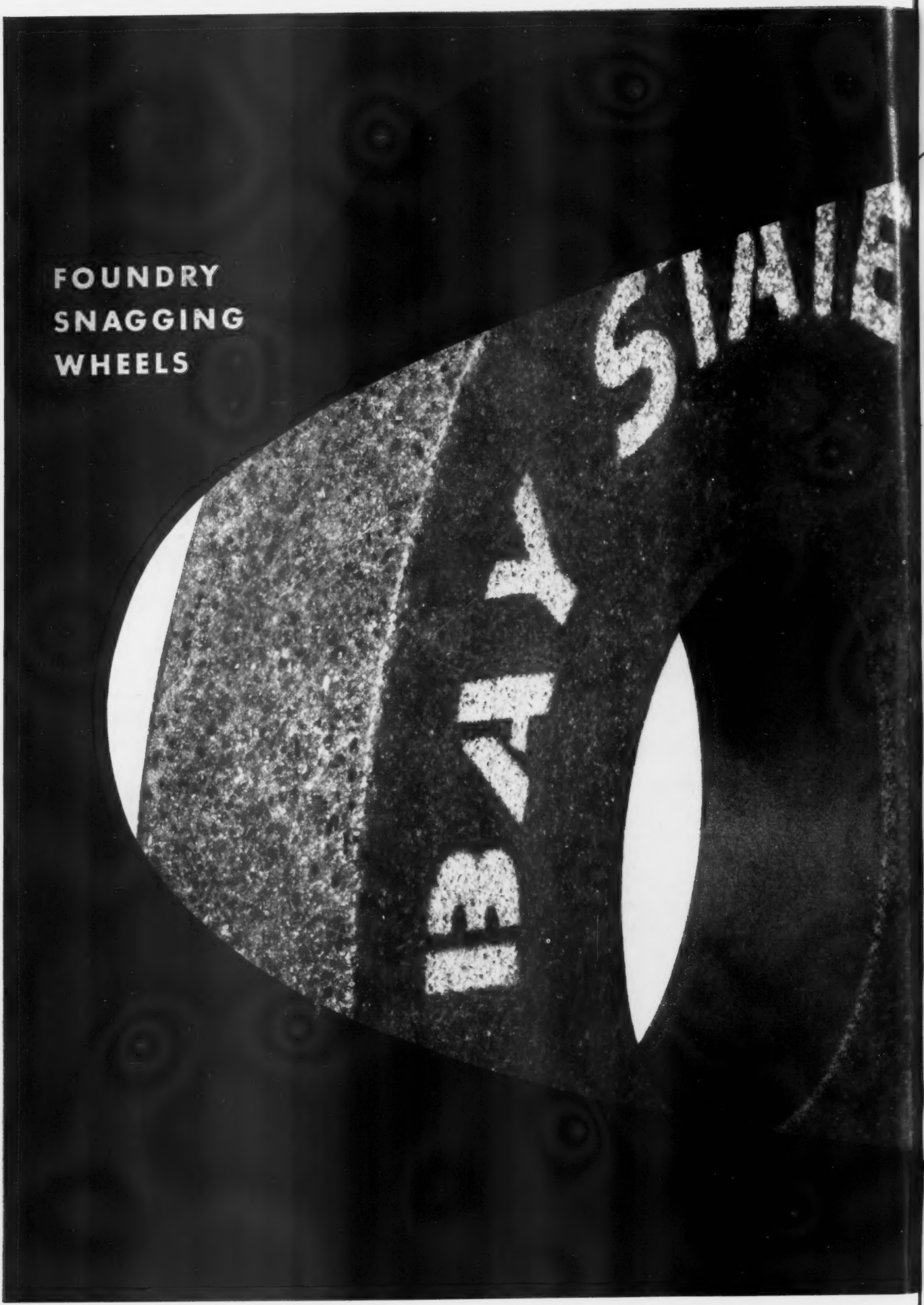
FOUNDRY SNAGGING WHEELS



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IN SAFE SNAGGING

For today's high-speed snagging, BAY STATE "builds" wheels with *both* extra cutting rate and safety!

These are "WHEELS of PROGRESS" for *your* foundry grinding, with unequalled uniformity, and specifically engineered for foundry use.

For floor stand, swing frame, or portable foundry grinding, get *all* the advantages of BAY STATE'S complete line of foundry abrasive products.

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ACTIVITIES OF FOUNDRY GROUPS

Western New York: "Casting Design and the Related Patterns for Casting Production," was the subject of William P. Bender at the Jan. 7 meeting of the AFS chapter at the Sheraton Hotel, Buffalo. Mr. Bender is a casting design engineer associated with Erie Foundries, General Electric Co., Erie, Pa. William J. Mosler, president, Economy Pattern & Pressure Cast Products, served as technical chairman.

Mr. Bender pointed out that planned engineering of castings and pattern designing leads to higher quality castings at lower cost. The customer can be saved money and his good will maintained through early understanding and agreement on changes to be made in design. Cores are expensive and should be used only when necessary. Procedures should be worked out between designer and a pattern and casting planning committee consisting of molding, core and cleaning room foremen, as well as a cost and wage rate supervisor.—*Roger E. Walsh, Hickman, Williams & Co.*

Twin City: About 75 members of the AFS chapter met Jan. 11 at Covered Wagon Restaurant, Minneapolis, to hear E. C. Zirzow, director of foundry service, Werner G. Smith Inc., Cleveland, discuss the technology of core blowing. A. W. Johnson, Northern Malleable Iron Co., chapter chairman, presided. The speaker outlined principles of good coreblowing operation and also considered factors which affect working properties of core sand and the mechanics of coreblowing.

A technical meeting on casting defects was held Jan. 18 at Archer-Daniels-Midland Co. Research Laboratory. Nathan Levinson, foundry superintendent, Minneapolis-Moline Co., served as technical director of the discussion. — *R. J. Mulligan, Archer-Daniels-Midland Co.*

St. Louis: On Jan. 13 the AFS chapter entertained two national directors at its regular meeting—J. T. Westwood, Blue Valley Foundry, and C. V. Nass, Beardsley & Piper Division, Pettibone Mulliken Corp., who also was guest speaker. Mr. Nass presented an illustrated talk on "Mechanization in Coremaking."

With labor costs increasing, it becomes more important than ever that labor-saving devices be used in direct production equipment as well as related materials handling equipment, Mr. Nass stated. All mechanization must be planned carefully and a certain degree of flexibility must be maintained lest the foundry find itself unable to adjust to changes in production requirements.—*Jack R. Bodine Jr., Bodine Pattern & Foundry Co.*

Washington: The chapter's first technical meeting of 1955 was held Jan. 20 at the Stewart Hotel, Seattle, with about 44 members and guests attending. Speaker was Donald J. Reese, assistant manager, Development & Research Division, International Nickel Co. His subject was "The Melting Department of an Iron Foundry."

To keep abreast of advances from hand to machine molding and now

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PARACOAT Pattern Finish

LASTS LONGER...DRAWS CLEANER...SAVES TIME

- Maintains its hard, smooth, tough, wear-resistant surface under all foundry conditions. Patterns draw clean with no damage to molds.
- Resists sand wear because of its rubber content. Users report 10 to 50 times the life of shellac and other finishes.
- Does not become sticky or tacky even when hot damp molding sand is rammed around Paracoated patterns.
- Finger dries in about 15 minutes —2 coats in 30 minutes.
- Requires no change in regular practice. Easily applied by brush, spraygun, or dipping.
- Can be applied to new, old, or repaired wood patterns. Does not raise the grain.
- Eliminates warping of patterns by preventing absorption or loss of moisture.
- Allows patterns to be stored in open sheds without danger of mildew, mold, or warping.

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Paracoat is a unique pattern coating containing rubber and other special modern chemicals carefully compounded in fast-drying solvent known as Parasolv. Represents many years of practical experience, research, and effort to build the ideal pattern coating.

WHAT PARACOAT DOES

Paracoat gives an ideal protective coating to wood, plaster, and metal patterns and core boxes. Because of its unusual characteristics, it is used for many other purposes in pattern, model, and woodworking shops. Taking the place of ordinary varnishes, lacquers and paints, it gives added protection from moisture, acids, alkalis, corrosive gases, etc.

WHY THOUSANDS USE IT

Paracoat gives better results at less cost. Thousands of wood and metal shops here and abroad increase their profits with Paracoat.

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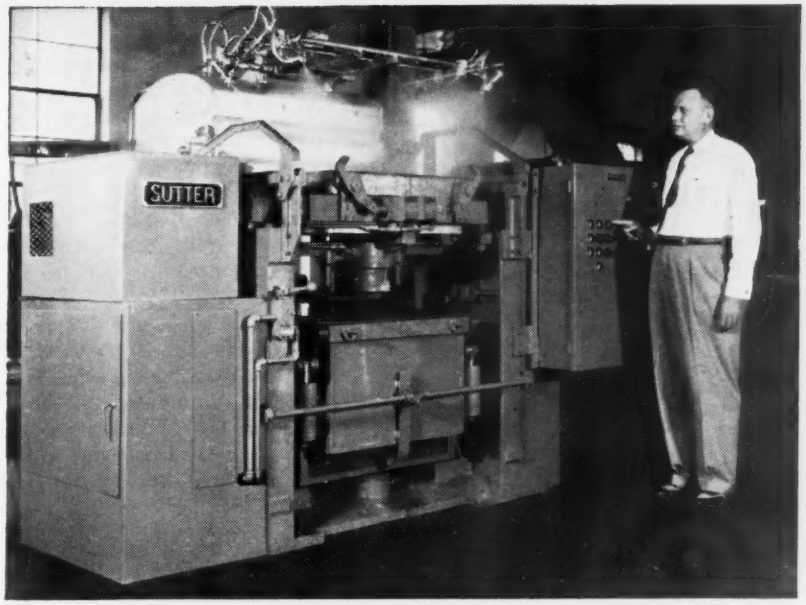

Mr. Ray Sutter at the single-station control panel of the shell molding machine made by Sutter Products, Dearborn, Michigan. The Sutter was one of the first machines to provide a completely automatic molding cycle including closely controlled coating, temperature and curing time. Maximum shell capacity is 20" x 30" x 6"; production rate 45 to 60 shells per hour. Gasfired; electric curing oven optional.

SPEED SHELL MOLDING WITH DOW CORNING 8 EMULSION

- **Assure Fast, Positive Release**
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- **Nonflammable and Noncorrosive**
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You can rely on Dow Corning 8 Emulsion to deliver finished shells promptly, easily and economically. Especially designed for the shell process, this silicone parting agent can't break down at operating temperatures to form a carbonaceous deposit on pattern surfaces. Cleaning costs are minimized, and you increase production of shells with consistently high dimensional accuracy. For more information and a free trial sample, return the coupon today.

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DOW CORNING SILICONES **in the Foundry**

FORD MOTOR USES SILICONE GREASE IN CORE OVEN CONVEYOR BEARINGS

With peak temperatures reaching 700 F, the six core oven conveyors at the River Rouge foundry of Ford Motor Company operate 16 hours a day, five days a week. Each system has 4 six-inch roller bearings mounted in the oven and 1200 trolley bearings that are exposed to oven temperatures an average of 2½ out of every 4 operating hours.

That's rough treatment for any bearing. Despite continuous lubrication and frequent cleaning, no conventional organic lubricant was able to prevent repeated work stoppages. Trolley bearings froze; rolling surfaces were flattened.

In 1948, after several successful test runs, Ford changed over to Dow Corning 41 Grease in all 7224 trolley and roller bearings. Power required to move the conveyors dropped 80%. The relubrication schedule for trolley bearings was reduced to once a week; once a month for the roller bearings. Labor, replacement and maintenance costs have been cut to a fraction of their former level.

Ford's experience is typical of the reports received from hundreds of plants now using Dow Corning 41 Grease in low-speed, antifriction bearings exposed to high operating temperatures. Data and performance as proved by many case histories are given in a new brochure on this remarkably heat-stable and versatile silicone lubricant. For your free copy of this brochure, call our nearest branch office or,

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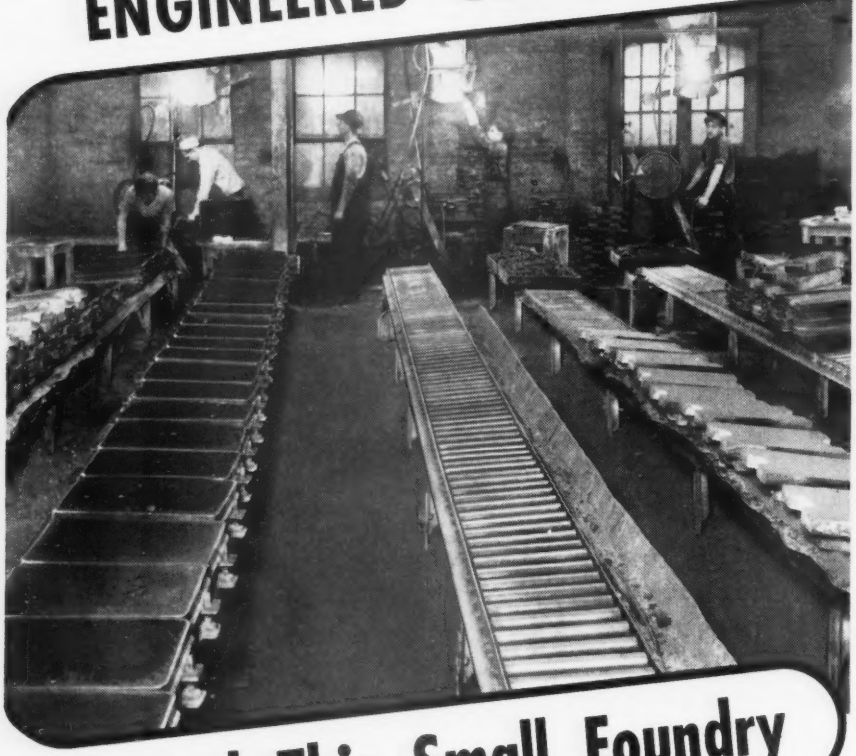

Helped This Small Foundry
INCREASE PRODUCTION 40%

ILLUSTRATING how the operation of a small plant can be made *more* efficient through the installation of an A-F *Engineered* Conveying System, this small Ohio foundry was able to easily increase its production 40% without increasing its floor space.

In small foundries especially, efficient operation makes the big difference between loss—and profit! But no matter how small or how large *your* foundry may be, you too can boost your production and reduce costs with an A-F *Engineered* Conveying System. Just think of being able to re-use sand four, five or more times a day, of re-using flasks many more times a day, and of improving the quality of your product while reducing rejects and breakage!

Without obligation on your part, write for a discussion of your sand, mold and flask handling problems—today.

THE ALVEY-FERGUSON
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SINCE 1901...FIRST IN PRODUCTS HANDLING EQUIPMENT

to automation, the melting department must advance concurrently, Mr. Reese pointed out. The duty of the melting department, he said, is to provide the required metal at the correct temperature and analysis and at reasonable cost. One trouble today is that many foundrymen are supplying the metal at the correct analysis but are not sure whether the cost is reasonable or can be reduced.

The speaker gave specific examples of foundries where changes were made and substantial savings resulted. Close examination of procedures, materials and processes, including cupola additions, blast pressure and moisture, would result in savings.—*William K. Gibb, Atlas Foundry* N *Machine Co.*

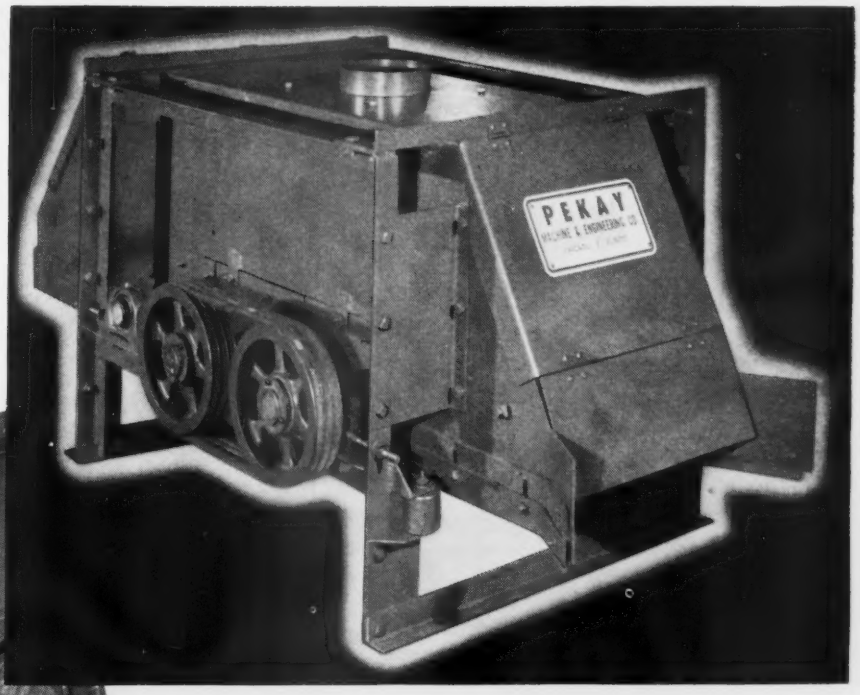
Southern California: Some 125 members of the AFS chapter met Jan. 14 at Rodger Young Auditorium, Los Angeles. William Baud, superintendent, Mechanical Foundries Division, Food Machinery Corp., and chapter vice chairman, presented a resume of the program for the California Regional Foundry Conference to be held Mar. 25-26 at the Huntington Hotel, Pasadena, Calif., in conjunction with the Western Metals Congress which begins on Mar. 28.

Donald J. Reese, assistant manager, Development & Research Division, International Nickel Co., spoke on "The Melting Department of an Iron Foundry." He referred to the optimistic business predictions being made for 1955 and challenged those present by stating it was up to them to help the foundry industry share in future world progress. During a question-and-answer period it was predicted there would be increased world-wide use of ductile iron in the next few years.—*W. G. Stenberg, U. S. Electrical Motors Inc.*

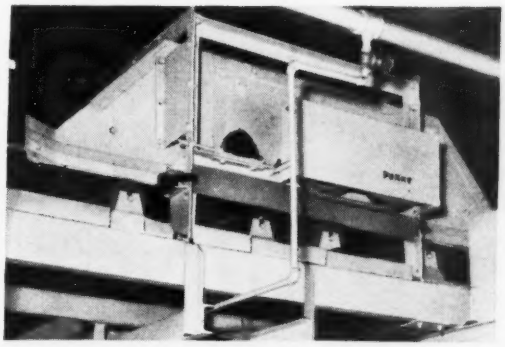
Oregon: Donald J. Reese, assistant manager, Development & Research Division, International Nickel Co., spoke on "Gray Iron Metallurgy" before the AFS chapter's Jan. 19 meeting at Columbia Athletic Club, Portland, Oreg. Portland Public Library has accepted the complete publications of the AFS as a gift from the chapter. J. T. Dorigan, Electric Steel Foundry Co., was named chairman of the Northwest Regional Conference scheduled for Portland in October.—*Bill Walkins, Electric Steel Foundry Co.*

British Columbia: Regular January chapter meeting featured a talk by Donald J. Reese, assistant manager, Development & Research De-

Stops Lump Trouble..
Cuts Scrap Loss..
Saves Maintenance..



2 AERATING CUTTER WHEELS AND THE AERATING FLUFFING WHEEL thoroughly *aerate* and *cool* the sand, carried directly into the Airator by belt conveyor. Note easy access to parts—even complete wheel replacement takes only about 2 hours or less, with no blow-torching needed.



The AIRATOR is easily installed on your present line, with a minimum of time and labor, and requires comparatively little space.

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HANDLES ALL THE SAND YOUR BELT CAN CARRY—*WITHOUT CLOGGING!*

In day-in, day-out use, PEKAY Airators are cutting scrap losses and reducing machining time for foundries throughout the country—because the Airator supplies a *constant flow* of thoroughly aerated, fluffed and cooled sand.

What's more, you have *total* availability of your production line at all times—the soundly-engineered Airator can't clog or choke up; long shut-downs of the line are unnecessary even for occasional maintenance; and you needn't cut up equipment to change parts.

You can have all these advantages for a surprisingly small outlay—because the Airator has been designed to keep both purchase price and installation costs at a minimum. It's solidly built but compact—approximately 2' high above belt, 6½' long, weighs 800 lbs., has practically unlimited capacity.

★ *Dimensional drawings and other data are given on the back of this page.*

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partment, International Nickel Co. He talked about "The Melting Department of an Iron Foundry" with particular emphasis on charging methods.—*J. T. Hornby, Balfour, Guthrie (Canada) Ltd.*

Pittsburgh: Frank Less, Durez Plastics & Chemicals Inc., North Tonawanda, N. Y., covered recent developments in iron, steel and nonferrous shell molding at the Jan. 17 meeting of Pittsburgh Foundrymen's Association at Webster Hall Hotel, Pittsburgh. G. H. Blackburn, Walworth Co., was discussion leader.

Mr. Less stated that initial progress in shell molding was slow because of early overoptimistic claims and lack of good equipment. Much pioneering work now has been done and the process is in what the speaker termed a "transition period." Mr. Less said that he considered shell molding to be an infant with a long life expectancy.

It also was pointed out that while some shell mold castings can be produced at a cost equal to or less than those in green sand, shell molding costs generally are higher because of the cost of the resin binder. Cost per casting can be cut by using the maximum area of the shell mold and through investment in better equipment.—*Robert Love.*

Central Michigan: "Youth Encouragement Night" was the theme of the Jan. 19 meeting of the AFS chapter at Hart Hotel, Battle Creek, Mich. E. J. Walsh, executive director, Foundry Educational Foundation, outlined the challenges and opportunities to be found in the foundry industry. Collins Carter, president, Albion Malleable Iron Co., also spoke briefly. Football pictures of the Michigan State-Notre Dame game were shown and narrated by Sonny Grandelius, former All-American and now an assistant coach at Michigan State College.—*Lewis C. Heisler, Gale Mfg. Co.*

Chicago: During March the AFS chapter will concentrate on its educational program, "Molding Methods for 1955." It will get under way at the Mar. 7 meeting at the Chicago Bar Association. During the following three weeks lecture sessions are scheduled in the Peoples Gas Building Auditorium.

Subjects and speakers are: March 7 — "Blow Squeeze Molding", by Dr. F. B. Rote, technical director, Albion Malleable Iron Co., Albion, Mich.; March 14—"Diaphragm Molding", by David Shannon, vice president, Somerville Iron Works, Chattanooga,

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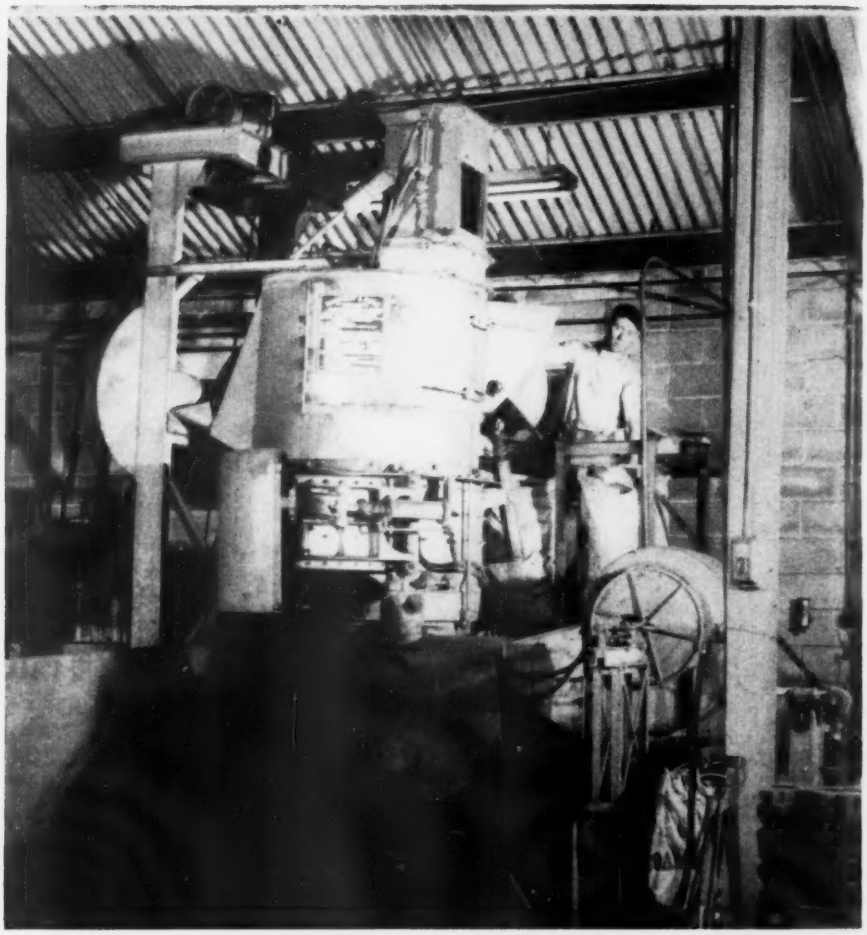
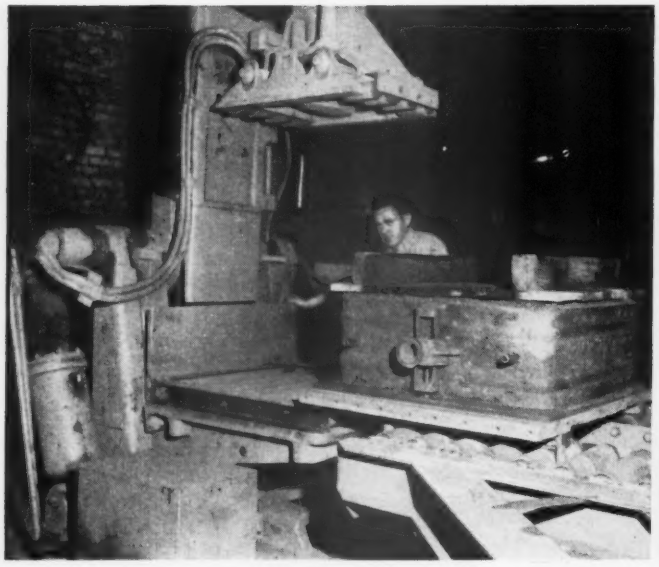
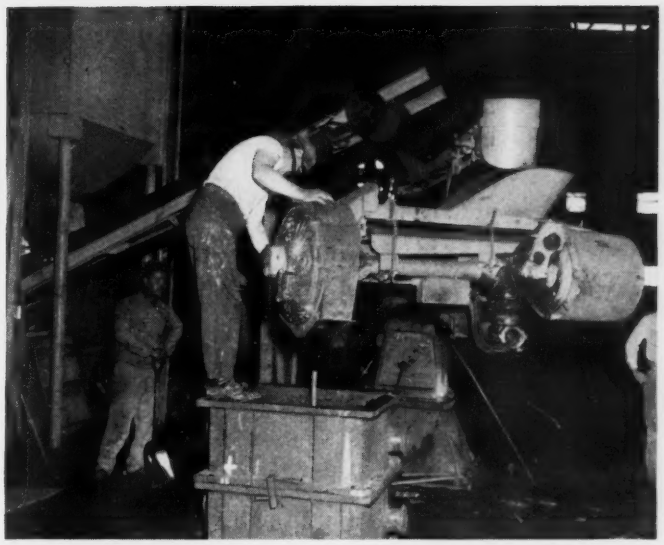


$60.00 A DAY is saved with this new Model "40-60" Speedmullor-Preparator Unit at the nine-molder Kelly Foundry & Machine Company, Elkins, West Virginia. With this low-cost unit, one man handles all the shakeout sand, delivers it to the Preparator, thoroughly conditions and mulls it in the unit, and returns the mulled sand to the molding floors. In addition to direct labor savings in the foundry, cleaning room costs are lower, casting losses are reduced, and the foundry has the advantage of better castings and a controlled operation. The unit is paying for itself in less than a year. *For full data write to Beardsley & Piper, 2424 N. Cicero Ave., Chicago 39, Ill.*

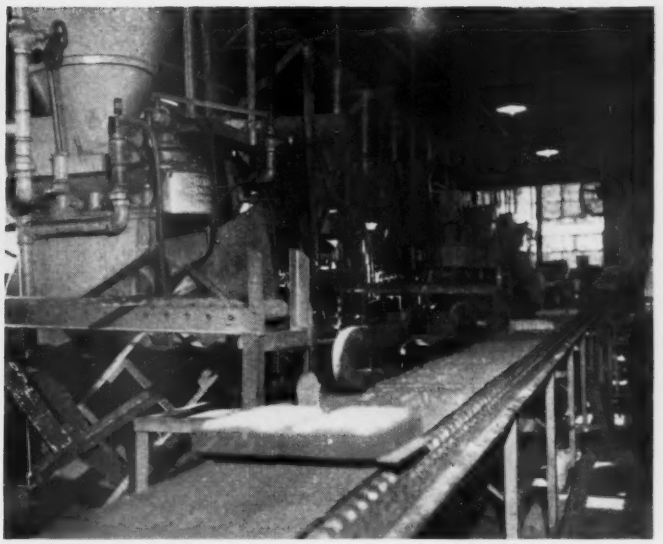


AN AUTOMATIC FLASK EQUALIZER and clamp and draw arrangement allows fast clamping of molds of various heights and automatically compensates for mold height irregularities on this J&J 920 Rol-A-Draw at Service Foundry of New Orleans. The Rol-A-Draw is part of a fast Slinger-Rotomold Unit that handles the foundry's jobbing work on a production basis. *For the full story of Service Foundry write to Beardsley & Piper, 2424 N. Cicero Ave., Chicago 39, Ill.*

ONE MAN operating two Model "60" Speedmullors mulls over 500 tons of all-purpose synthetic molding sand daily for the high production molding operation at the Lufkin Foundry & Machine Company of Lufkin, Texas. *One minute mulling cycles* are ample to obtain the high sand physical properties required to meet Lufkin's exacting specifications. *For full information write to Beardsley & Piper, 2424 N. Cicero Ave., Chicago 39, Ill.*



DIBERT, BANCROFT & ROSS CO., LTD. of New Orleans, one of the leading steel foundries of the South, uses a Stationary Sandslinger to ram a wide variety of jobbing work. This slinger with raising and lowering arms easily handles molds of various heights. The work is greatly speeded and molds are rammed truer-to-pattern than by other molding methods. *Full information may be obtained by writing to Beardsley & Piper, 2424 No. Cicero Ave., Chicago 39, Ill.*



FOUR CHAMPION CORE BLOWERS in the core room of Texas Foundries, Inc., at Lufkin, Texas are doing a real job. There, in the largest Malleable Foundry in the South, Champion Flexiblos have proved valuable because of their outstanding ability to handle a wide range of different jobs and all types of core boxes . . . vertically-split, horizontally-split or open-face. *For the latest information write to Beardsley & Piper, 2424 N. Cicero Ave., Chicago 39, Ill.*

A MODEL "60" SPEEDMULLOR at the Texas Foundries, Lufkin, Texas, mulls the oil bonded core sand for this malleable foundry's modern core room. The sand is thoroughly mulled to exacting specifications in one-and-a-half minute total mullling cycles. Loading is conveniently accomplished by Speedmullor Skiphoist. *Beardsley & Piper, 2424 N. Cicero Ave., Chicago 39, Ill. will provide full data.*

Tenn.; March 21—"Shell Molding", by Clifford W. Schwenn, works manager, Brillion Iron Works Inc., Brillion, Wis.; and March 28—"Improvement of Conventional Molding Methods", by R. F. Meader, factory superintendent, Whitin Machine Works, Whitinsville, Mass.

The chapter's Feb. 7 meeting, which featured four roundtables, was designated National Officers' Night. Chapter President Robert L. Doelman, sales engineer, Miller & Co., introduced National Director C. V. Nass, vice president, Beardsley & Piper Division, Pettibone Mulliken Corp., and National AFS General Manager William W. Maloney. Both spoke briefly on society matters.

Vice President James T. Moore, office manager, Wells Mfg. Co., introduced participants in the roundtable sessions. John A. Van Haver, manager, Sealed Power Corp., Muskegon, Mich., addressed the Gray Iron Division on "Necessary Controls for Light-Section Quality Castings". H. K. Briggs, sales metallurgist, Miller & Co., presided.

The Maintenance Division directed its attention to "Operation and Maintenance of Pneumatic Sand Handling Equipment" with W. Wroblewski, Crane Co., as speaker and E. Greenless, master mechanic, Kensington Steel Co., as chairman.

"Melting of Brass and Bronze" was the discussion topic for the joint Nonferrous and Pattern Divisions roundtable, with H. M. St. John, superintendent, Crane Co., as speaker. D. G. Schmidt, metallurgist, H. Kramer & Co., was chairman, and D. Stockberger, Chicago Pattern Works, was co-chairman.

Steel and Malleable Divisions combined to consider "Casting Improvement by Modern Inspection", with F. J. Satek Jr., metallurgist, Continental Foundry & Machine Co., as speaker. P. Gouwens, Fahralloy Co., presided.—*Erle F. Ross.*

New England: Installation of officers for 1955 took place at the Jan. 12 meeting of the New England Foundrymen's Association. Officers for the coming year are Howard B. Nye, Crompton & Knowles, president; Ahti Erkkinen, Builders Iron Foundry, vice president, and Thomas I. Curtin Jr., Waltham Foundry, secretary-treasurer.

Executive committee consists of the following: Henry M. Frechette, Fitchburg Foundry Co.; Albert N. Nutter, LeBaron Foundry Co.; Clyde Armstrong, Warren Pipe Co.; C. W. Hutchins, Standard Foundry Co.; Alexander Beck, Whitman Foundry Inc.; William Ohlson, Draper Corp.; Frank Benoit, Brown & Sharpe Mfg. Co.; William Hale, Chapman Valve Co., and Charles A. Reed, Cambridge, Mass.—*Alexander Beck, Whitman Foundry Inc.*

Ohio State: An informal meeting of the AFS student chapter was held in the Industrial Engineering Bldg., Jan. 11, on the campus. Dwight C. Swepston, vice president, Columbus Junior Chamber of Commerce, talked on the functions and objectives of the Jay Cees and the challenges such an organization presents to civic-minded young men. The next chapter meeting will be held with the Central Ohio Chapter of the AFS.—*W. Fred Clutton.*

Saginaw Valley: Jan. 6 was National Officers Night meeting for the AFS chapter. W. W. Holden, Eaton Mfg. Co., chapter chairman, presided before 125 members and guests who assembled at Frankenmuth, Mich. Regional Vice President E. C. Hoenicke, Eaton Mfg. Co., and National Director Claude B. Schneible, Claude B. Schneible Co., enlightened mem-

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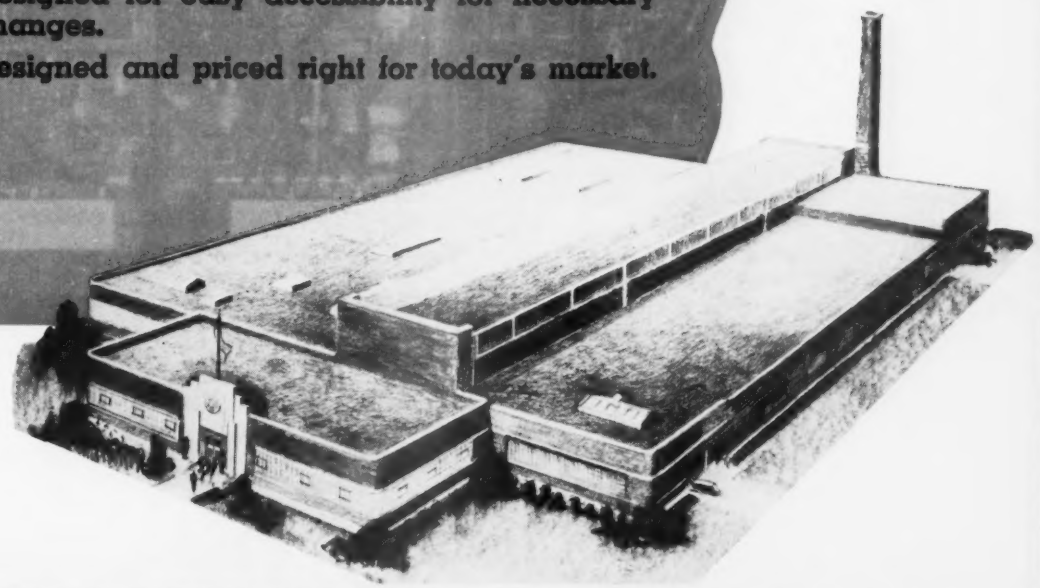

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bers about the AFS national organization and the value of membership from management's standpoint. C. E. Nelson, technical director, Magnesium Dept., Dow Chemical Co., was introduced as national director nominee.

Dr. Richard A. Flinn, University of Michigan, discussed "Research in Tomorrow's Foundry Problems," a progress report on metallurgical research being carried on at Michigan. Procedures to be improved upon in making castings in the future are melting, solidification and molding. Correlation of microstructure to properties is another area for research. Microbend test was offered as a tool to study the relation of structure to properties.

Dr. Flinn also touched briefly on titanium castings, high-temperature alloys, vacuum melting, vacuum fusion analysis, shrinkage and feeding properties of various alloys, tracer techniques with nodular iron to determine the role of various elements in changing graphite structure, and comparison of surface finish and reproducibility of dimensions of shell mold castings with those of castings made by other methods.—*Nicholas Sheptak, Dow Chemical Co.*

Central New York: Over 250 members and guests of the AFS chapter attended the annual Christmas party in the ballroom of the Onondaga Hotel, Syracuse, N. Y., on Dec. 11. Guests from Eastern and Western New York and Rochester chapters attended. Dinner, refreshments, elaborate floor show, and prize drawings featured the entertainment program.

John R. Lewis, development engineer, Titanium Alloy Mfg. Division, National Lead Co., spoke on "Zircon and Its Use in the Foundry" before 92 members and guests of the chapter at its Jan. 14 meeting in the Roof Garden, Onondaga Hotel. He presented recommended mixtures for green and dry sand cores as well as green sand molding. Mixing and baking times also were discussed. Moisture should be kept to a minimum and dry coreboxes and tools should be used, the speaker cautioned.—*Bruce Artz, Pangborn Corp.*

Northeastern Ohio: Despite a heavy snowfall, a good turnout was present at the Tudor Arms Hotel, Cleveland, on Jan. 13 to hear Hans J. Heine, technical director, AFS, speak before the AFS chapter on "Another Approach to Casting Design."

To stay in business in today's competitive economy, foundrymen must look to methods and techniques that will produce high-strength, lightweight castings at low cost, Mr. Heine said. Castings producers could accomplish these ends if they would design for directional solidification, find and use good casting design concepts, simplify as much as possible, go after conversions, and make use of experimental stress analysis. Mr. Heine also discussed brittle lacquer stress testing and described it as a simple, inexpensive method to pinpoint and determine degree of stress so metal can be added or removed accordingly.—*Jack C. Miske.*

Connecticut: Connecticut Non-Ferrous Foundrymen's Association met Jan. 20 at Quinnipiack Club, New Haven, Conn. Speaker was Frederick R. Smith, apprentice representative, U. S. Dept. of Labor, Bridgeport, Conn., on the subject of "Apprentice Training."

Mr. Smith's remarks indicated the foundry industry is undergoing a state of technological and production changes due to mechanization and labor problems. Mechanical changes can be purchased. The more changes in equipment or product, the higher caliber and flexibility in help is required to adapt quickly to the new environment. The personnel problem is greater than the mechanical one and involves analysis and determination for its solution.

The speaker's experience in dealing with situations comparable to those in the foundry industry, indicates that solutions are possible and profitable if the industry is willing to work for them. Personnel programs, educational programs and apprenticeship training were offered as suggested remedies.—*Frank B. Diana.*

Western Michigan: Two round-table discussions featured the Jan. 10 meeting of the AFS chapter at Cottage Inn, Muskegon, Mich. About 90 members attended. Ferrous group, directed by A. W. Demmler, Campbell, Wyant & Cannon Foundry Co., discussed foundry problems pertinent to coke, cupola exhaust content and cleaning, borings injection and briquets, basic lining and titanium ore. Nonferrous group, directed by A. E. Jacobson Jr., Grand Haven Brass Co., discussed problems of pattern partings, coatings, coremaking and the CO_2 process.—*Wilson W. Hicks, Sealed Power Corp.*

Birmingham: Sixty-five members and guests of the AFS chapter met at the Tutwiler Hotel, Birmingham, on Jan. 21 to hear James H. Lowe, Mid-Continent Steel Casting Corp., Shreveport, La., talk on "Castings

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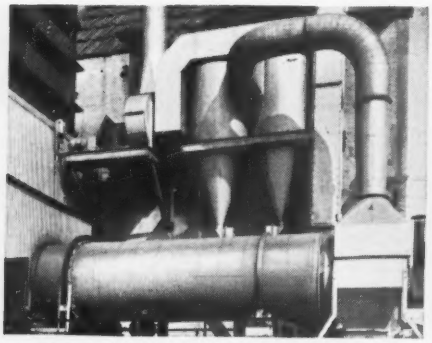

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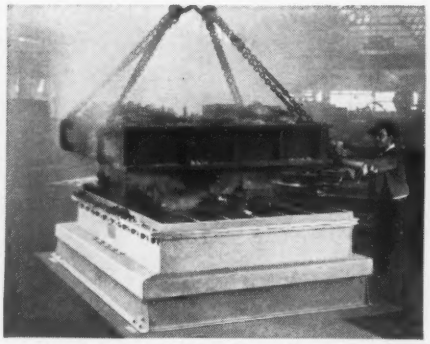
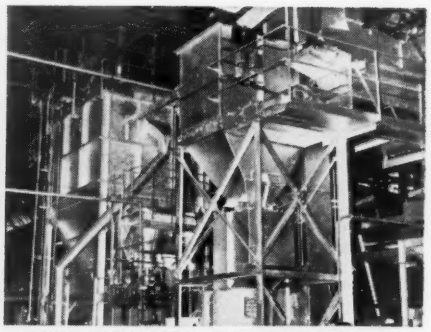


SHAKEOUTS AND SCREENS — Complete line provides centralized separation of sand and castings or sand screening for every type and size foundry.



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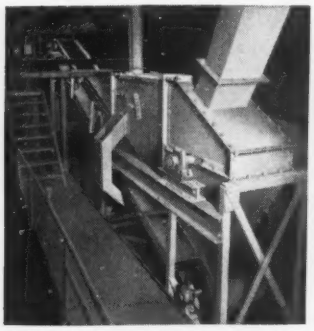
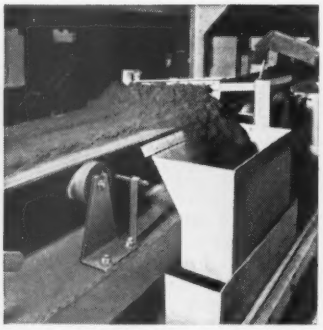
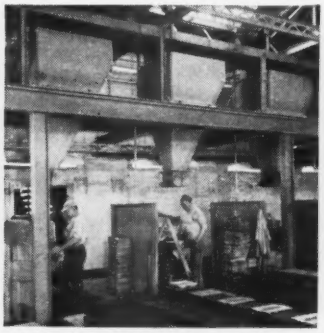


REVIVIFIERS — Thoroughly disintegrate, blend, cool molding sand so it will ram to uniform density. Also remove shot.



BELT CONVEYORS — Flat belt has plows to distribute sand to molders' hoppers. Troughed type used for other sand handling.



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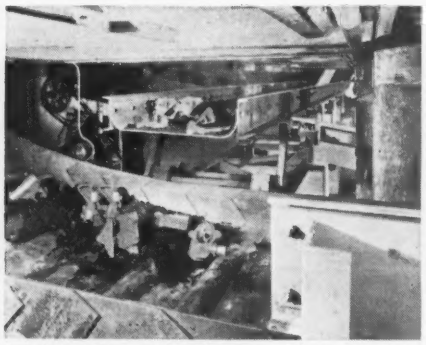

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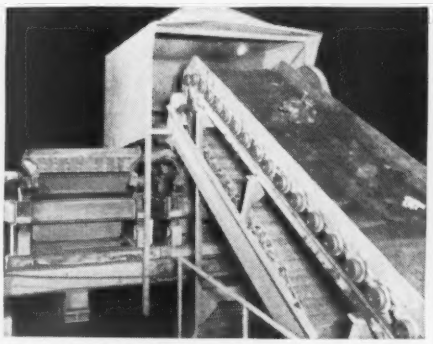

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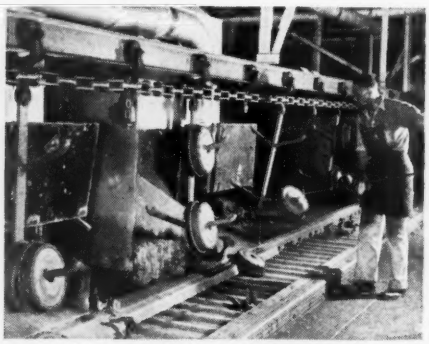

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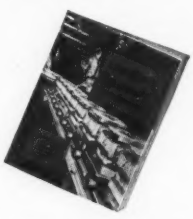

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versus Weldments." Steel Founders' Society film, "Steel Casting Design," was shown prior to Mr. Lowe's talk. Edwin E. Pollard, Caldwell Foundry & Machine Co., chapter chairman, presided.—*J. A. Wickett, U. S. Pipe & Foundry Co.*

Metropolitan: More than 150 members and guests of the AFS chapter assembled in January at the Essex House, Newark, N. J., to hear Prof. Howard F. Taylor, Massachusetts Institute of Technology, discuss the theory and use of insulating and exothermic materials for risers, including a review of heat transfer phenomena in the solidification of castings. Comparative efficiencies of sleeve, pad and hot-top materials, as well as certain combinations of these, were illustrated with factual data secured from laboratory and field investigations by MIT and other research groups.

A lengthy question-and-answer period covered heat transfer in molds, economics of hot-top and sleeve use, method of preparation and curing of sleeves and inserts, and the availability of specially compounded exothermics for high-alloy castings to eliminate the expensive segregation of risers for revert material.—*Seymour B. Donner, Cooper Alloy Corp.*

Wisconsin: Hans J. Heine, technical director, AFS, addressed the January meeting of the AFS chapter. Mr. Heine offered some of the latest information, techniques of casting design and practical hints on how to recapture lost business and develop new business through changes and improvements in casting design.—*John E. Hubel.*

San Antonio Section: A safety film, "If You Bring Your Family To Work," was seen by 28 members and guests of the AFS group on Jan. 17 at San Antonio Machine & Supply Co., San Antonio. A casting clinic also was held. Refreshments were served by the host foundry.—*George H. Hartwell.*

Reading: Over 100 members and guests attended the Jan. 18 meeting of the Reading Foundrymen's Association in the ballroom of the Berkshire Hotel, Reading, Pa., and heard John W. Juppenlatz, Quaker Alloy Casting Co., Myerstown, Pa., discuss "Progress of Steel and Alloy Castings." Robert M. Schumo, Pennsylvania Electric Steel Castings Co., served as technical chairman and introduced the speaker.

Prof. W. P. Winter, foundry instructor, School of Engineering, Penn-

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"ESSO-FLO" is hard, smooth, abrasion-resistant—does not break up in use. When added to core and molding sands "ESSO-FLO" improves flowability—allowing the sand to flow evenly onto the pattern with a minimum of pressure—resulting in castings of truer pattern dimension.

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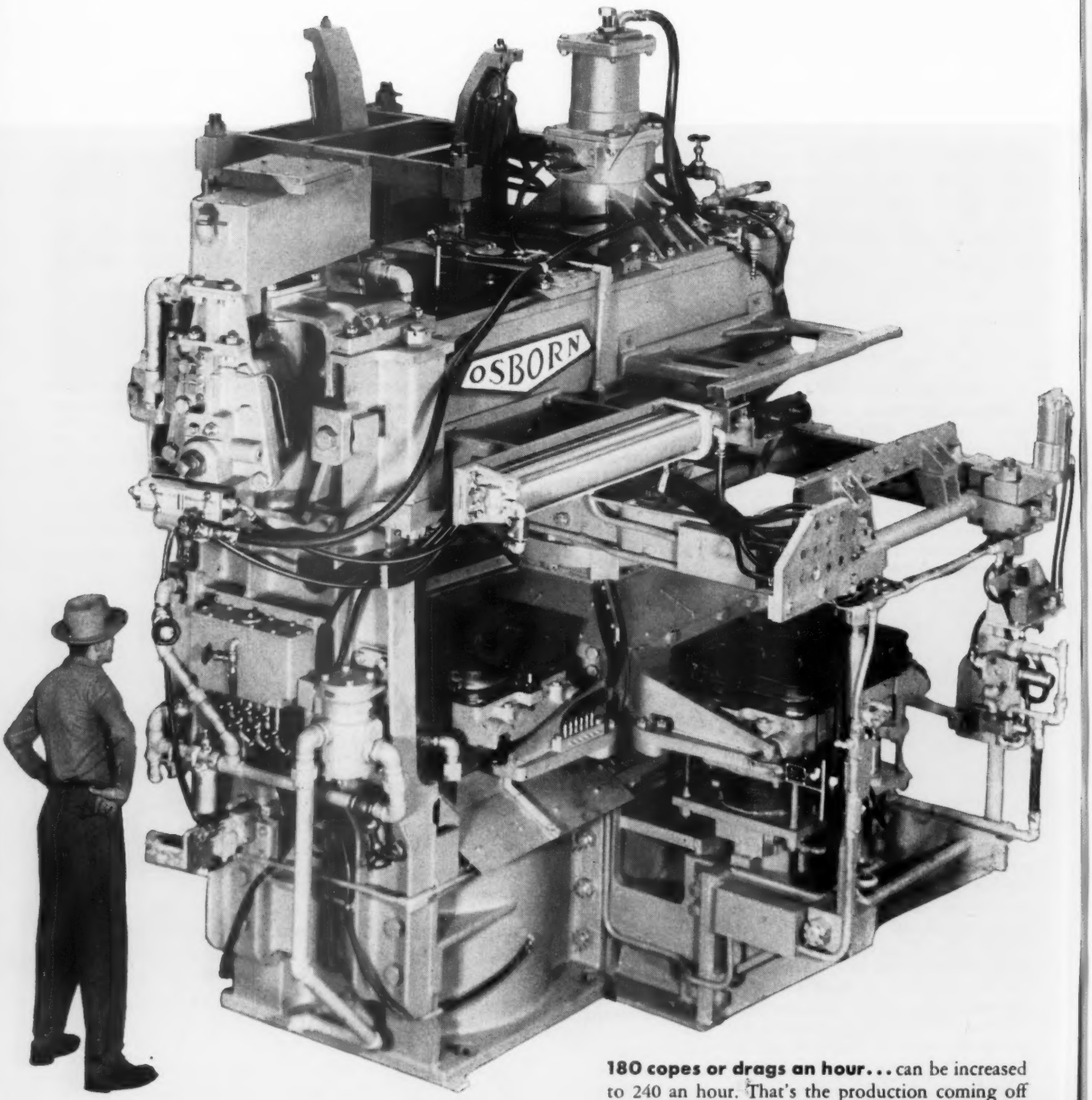
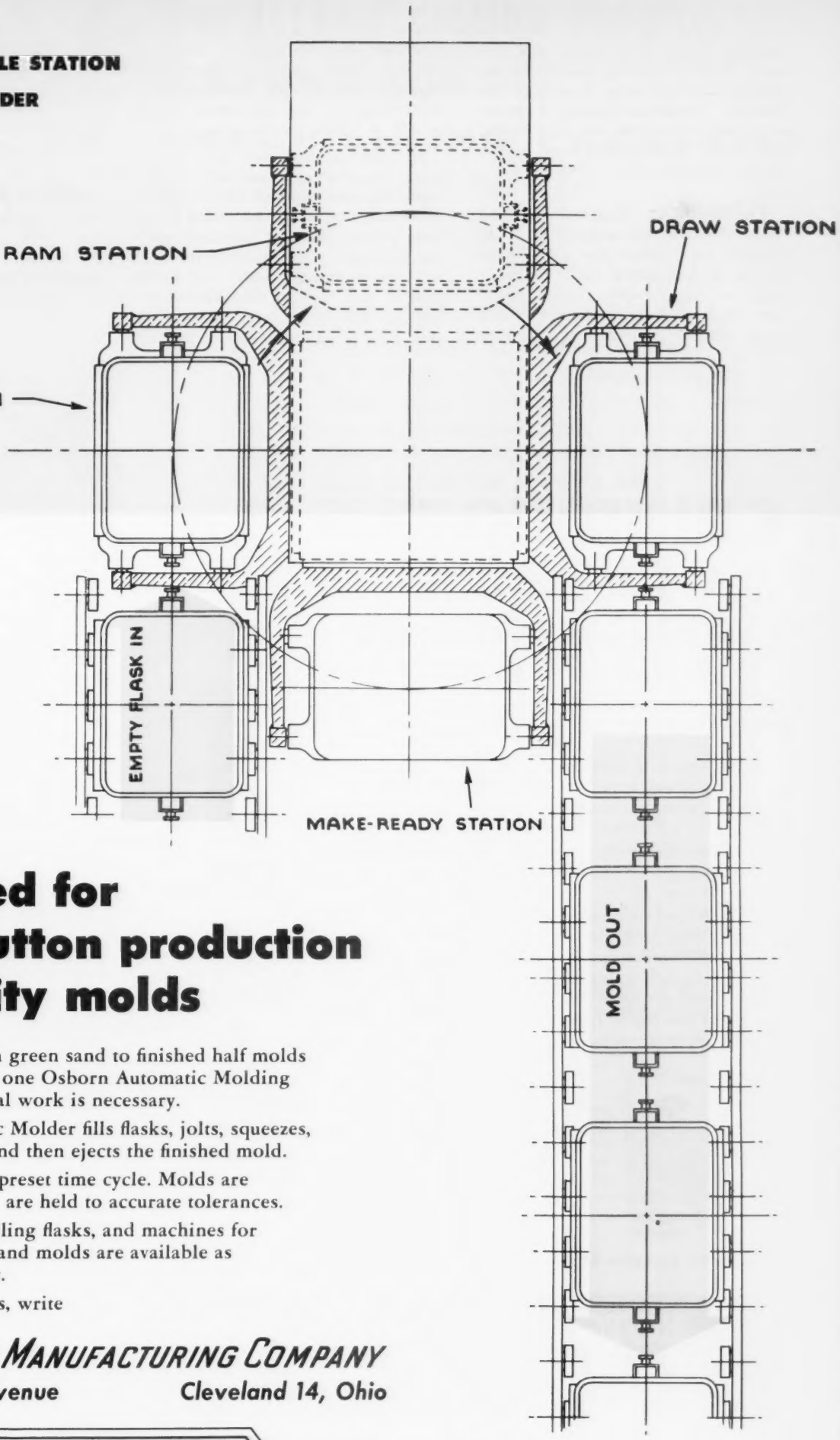
For the latest in foundry automation ...look to OSBORN



180 copes or drags an hour... can be increased to 240 an hour. That's the production coming off this newest Osborn Automatic Molding Machine.

LET US SHOW YOU WHAT OSBORN AUTOMATION WILL DO FOR YOU

PLAN VIEW OF
OSBORN MULTIPLE STATION
AUTOMATIC MOLDER



Designed for push-button production of quality molds

All operations from green sand to finished half molds are handled by this one Osborn Automatic Molding Machine. No manual work is necessary.

Osborn's Automatic Molder fills flasks, jolts, squeezes, draws the pattern and then ejects the finished mold.

Production is on a preset time cycle. Molds are uniform density . . . are held to accurate tolerances.

Conveyors for handling flasks, and machines for turning over flasks and molds are available as auxiliary equipment.

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THE OSBORN MANUFACTURING COMPANY
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OSBORN

MOLDING MACHINES CORE BLOWERS
INDUSTRIAL BRUSHES

Another example of Osborn leadership and advanced engineering

sylvania State University, and his class of 12 in-training industrial education teachers were guests of the chapter. Industrial education teachers from all the schools in Reading and Berks Counties also were guests at the meeting.—*W. I. Cassidy.*

Philadelphia: "History of Sand Additives" was the subject of J. A. Gitzen's talk before the AFS chapter at the Engineers Club, Philadelphia, on Jan. 14. Mr. Gitzen, president of Delta Oil Products Co., has been actively engaged in foundry problems for 30 years. John B. Stevens, sand engineer, Bethlehem Plant, Bethlehem Steel Co., was technical chairman. Meeting was attended by 121 members and guests.

Mr. Gitzen discussed sand additives, their history, use and advantages. He elaborated on various ways of ruining the properties which additives give to sand, by improper mixing sequence, poor temperature control when drying cores, too short time in oven, and burning. He recommended that a properly baked core should be dried 12 hours per inch of core thickness, with a core mix at 2½ per cent oil. A core with 1½ per cent oil should be baked about 7 hours per inch of core thickness to insure a dry core.—*Charles R. Sweeny, Atlantic Steel Castings Co.*

GRINDING TIME CUT 50%

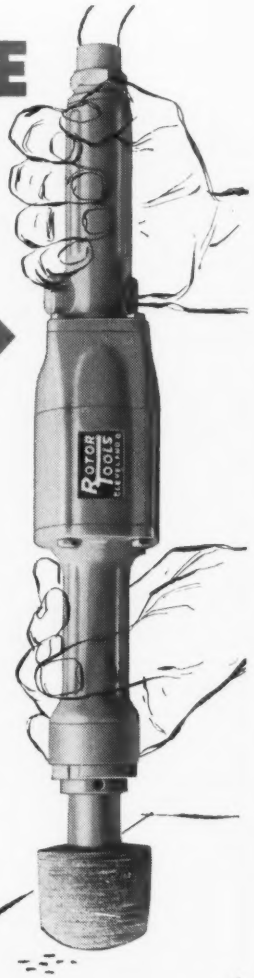
New Rotor D-4S Air Grinder pays for itself in 12 weeks

Job: Grinding defects in holes of castings with cone wheel (size 2¾" x 3½" x ⅝"). Formerly used 3600 rpm electric grinder (3 phase, 220v.). Job took 8 minutes—too slow.

Solution: Rotor Application Engineer suggested changing to Rotor D-4S Cone Grinder—speed 8500 rpm.

Results: Saves 4 minutes per casting; doubles output. With 50% use factor, savings paid for new Rotor Grinder in 12 weeks. Wheels last longer. Tool is lighter (only 8¼ lbs.); easier to handle. No tool stalling—even when crowded in hole.

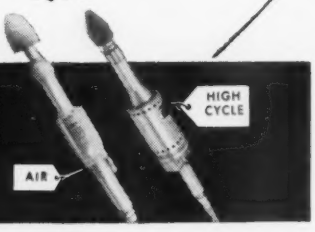
Get the Rotor Engineer on *your* portable tool jobs to save *you* money!



APPLICATION

Rotor D-4 Air Grinders are available with straight or grip handle at 8500 rpm for cone wheels and 4" elastic wheels and at 6000 rpm for cone wheels, 6" elastic wheels and 4" vitrified wheels.

ASK FOR BULLETIN 43



THE ROTOR TOOL CO.
CLEVELAND, OHIO

Eastern New York: "AFS Research—Your Foundry's Silent Partner," was the subject of Hans J. Heine, technical director, AFS, as he addressed the AFS chapter at Panetta's Restaurant, Menands, N. Y., for its January meeting. To attract more business, the foundry industry must make more use of new developments and technological advances and must employ more engineers and metallurgists, Mr. Heine stated. He said that tremendous results at small cost can be obtained through use of stress analysis by brittle lacquer coatings. It enables the foundryman to design adequately and economically, to locate areas of maximum stress concentration so he can add or remove metal accordingly.

In the future, Mr. Heine said, the foundryman should make wider use of vacuum melting to improve properties, high-carbon coke, and carbon dioxide baking for cores and molds. —*L. J. DiNuzzo, General Electric Co.*

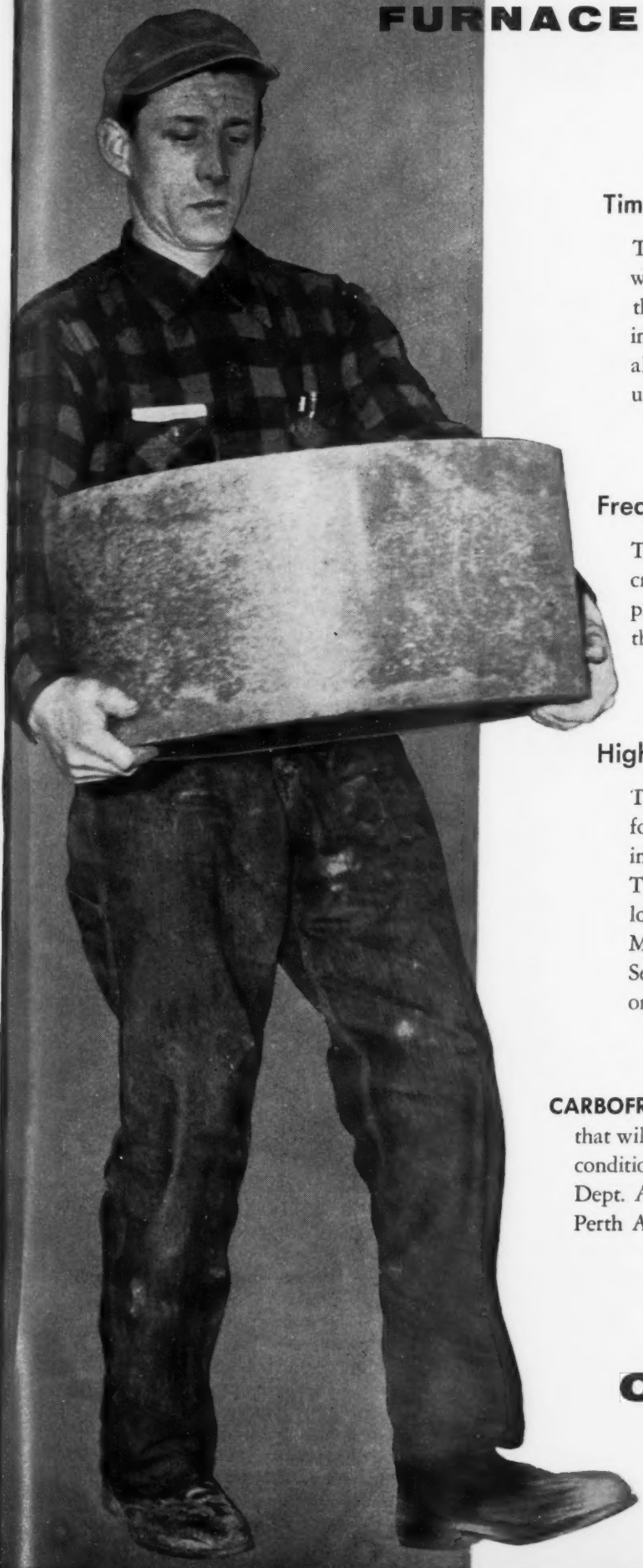
Central Ohio: A joint meeting of the AFS chapter with the American Society of Metals Chapter was held at the Seneca Hotel, Columbus, O., on Jan. 5, with 100 members of both groups attending. Frank H. Beck, Ohio State University, ASM chairman, presided. J. H. Jackson, Battelle Memorial Institute, ASM vice chairman, introduced S. C. Massari, manager, Foundry Division, Hansell-Elcock Co., Chicago, who discussed "Recent Developments in the Casting Field."

Mr. Massari enumerated various foundry fundamentals, stressed the importance of consultation between foundryman and designer, and elaborated upon recent developments in high-pressure diaphragm molding, shell molding, "D" process, gating systems, nodular iron, basic cupola and water-cooled cupola tuyeres.—*Eldon Boner, Cooper Bessemer Corp.*

Northwestern Pennsylvania: The Moose Club, Erie, Pa., was the site of the January meeting of the AFS Chapter. William W. Maloney, general manager, Thomas Kaveny Jr., national director, and Dan J. Hayes, administrative assistant of the AFS, attended the noon luncheon meeting of the directors. At the general meeting in the evening, George L. Hoobler, International Nickel Co., spoke on "Ductile Iron."—*Roy A. Loder, Erie Malleable Iron Co.*

CARBOFRAX® rings plus ALFRAX® castable cement...

END THESE NONFERROUS FURNACE LINING PROBLEMS



Time-consuming installation . . . GONE

These CARBOFRAX silicon carbide rings are only 1½" thick; weigh about 70 pounds apiece. One man can place them in a furnace without a hoist. Complete relining job, including preparing and pouring the ALFRAX aluminum oxide castable cement back-up lining, usually takes about an hour and a half.

Frequent repairs . . . GONE

The silicon carbide rings resist flame erosion, spalling and cracking. They last many months with next-to-no patching; prevent cutting away or erosion of the insulating cement that backs them.

High fuel costs . . . GONE

The thin CARBOFRAX rings leave plenty of space for the ALFRAX cement, one of the most effective insulating materials ever developed for high temperatures. The ALFRAX insulation holds heat losses to a minimum . . . lower heat capacity furnace works faster with less fuel! Melting time is consistent throughout the day. Service records show many cases where operators report one to two extra heats per day!

CARBOFRAX linings are also available in segmental shapes that will fit any size crucible furnace. Let us know your operating conditions and we will be glad to make recommendations. Address Dept. A35, Refractories Division, The Carborundum Company. Perth Amboy, N. J.

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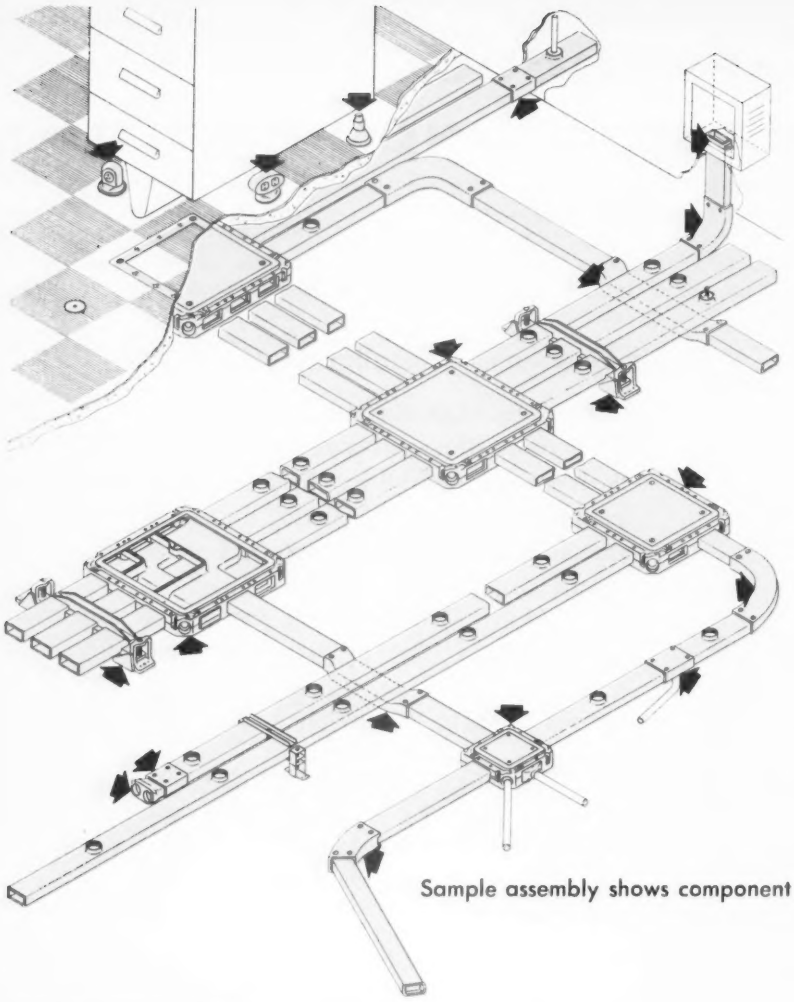
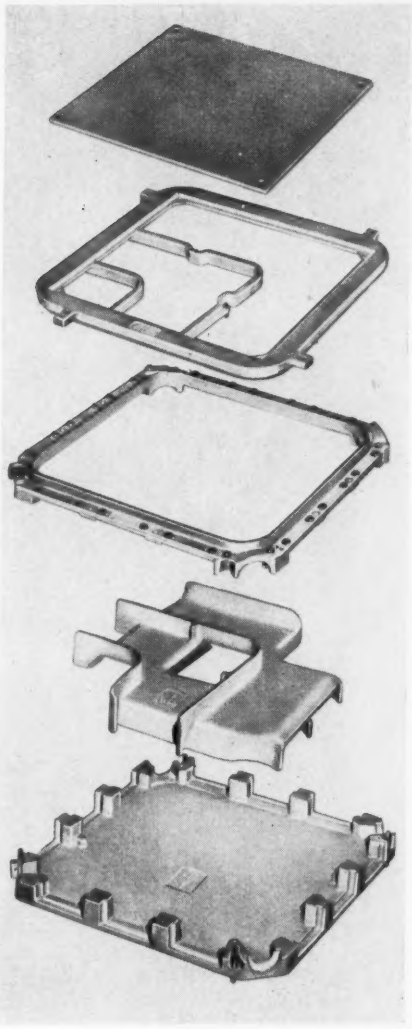
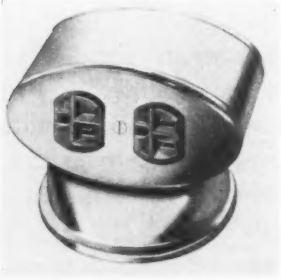
Registered Trade Mark



Sample assembly shows component parts

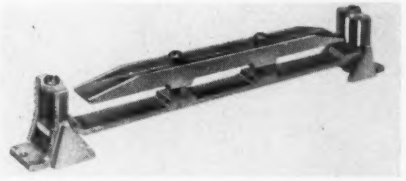


Sections of a three-duct junction box. From top to bottom: Cover plate, ring, cover, partition and base. All are cast aluminum except the cover plate



Left: Standard service outlet receptacle is of cast aluminum

By ROBERT H. HERRMANN
Associate Editor



Aluminum castings make up this adjustable duct-supporting unit

PROPER DESIGN and ALLOY SELECTION

Creates High-Demand Castings

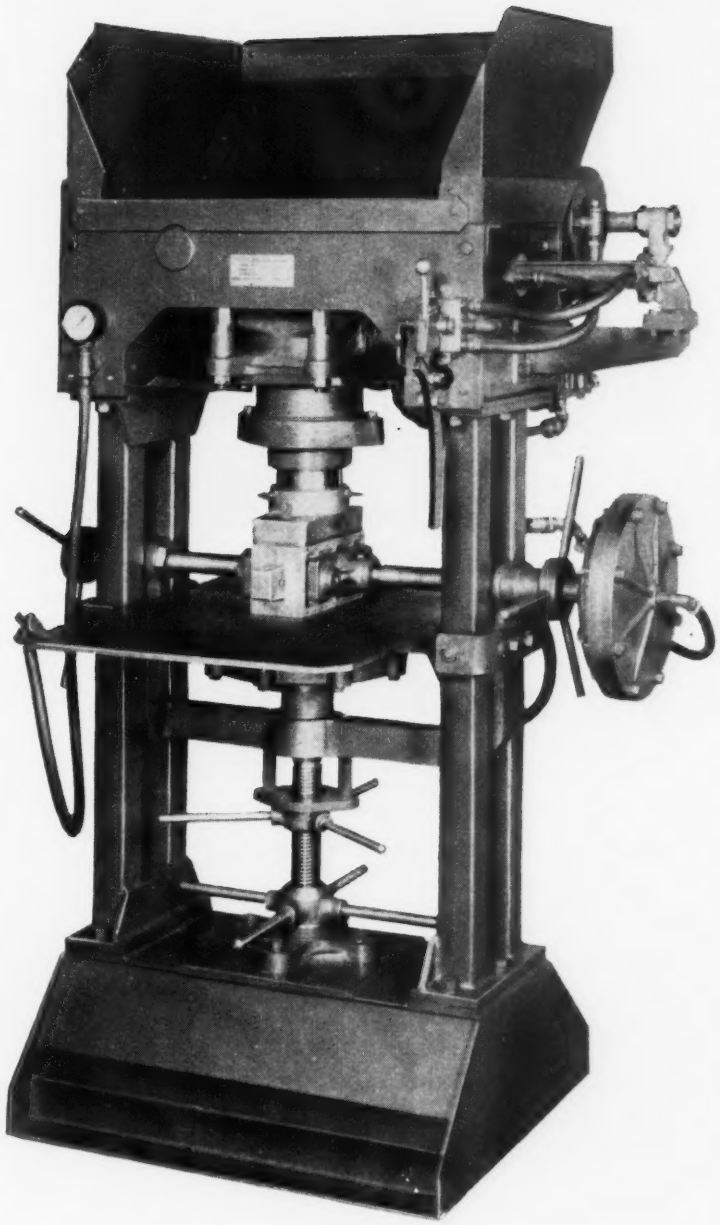
PRACTICAL part design to meet a specific need has expanded the market for aluminum castings made by Howard Foundry Co., Chicago. The parts are used in an underfloor wire distribution system developed by the company's Howard Electric Division for commercial and industrial buildings.

Of the 28 parts in the system, 22 are cast aluminum. These include junction boxes to handle formed steel wire-carrying ducts, duct support brackets, above-floor receptacle service outlet fittings, and duct elbows, cross-unders, conduit fittings, couplings and connectors.

Much thought went into the planning to develop a system of comparatively few, standardized parts. Parts are designed for quick, easy assembly to cut down installation time. Junction boxes have almost full work openings to aid pulling wires into the box and for inspection. Duct openings into junction boxes and removable partitions in the boxes give more than 100 per cent of the cross-sectional duct area for pulling wire and making splices and taps. Depth of the box is adjustable with the standard ring and ring extensions. These rings and the partition support the ¼-in. plate-steel work opening cover so that it will not dish even under the weight of an industrial truck. Leveling screws are outside the rings so that the cover need not be removed to level the boxes to the floor surface.

All parts in the system have a bright yellow, baked coating. This

Redford NO. 4 CORE BLOWER



Designed to add more power, capacity and speed to traditional Redford simplicity, flexibility and convenience, the No. 4 Redford superbly fills the need for a truly fast and flexible machine to blow cores from a few ounces to 10 lbs.

There is no need for the operator to wait for the machine at any time—the fast operating cycle permits immediate release of the core box after the cores have been blown.

Exhaust air is utilized to thoroughly fluff the sand remaining in the sand magazine after each blow, thus reducing the possibility of cratering.

Magazine heads normally furnished with the No. 2 Redford machine can be used with the No. 4 Redford. Larger new type magazine heads are also available as standard equipment.

A completely new fully adjustable clamp for vertically parted core boxes simplifies core box set up—when not needed the clamp units can be adjusted all the way out or completely taken off the machine.

Redford No. 4 users report production up to 8 boxes per minute using only one core box per machine. To get complete information write for Specification Bulletin 4.

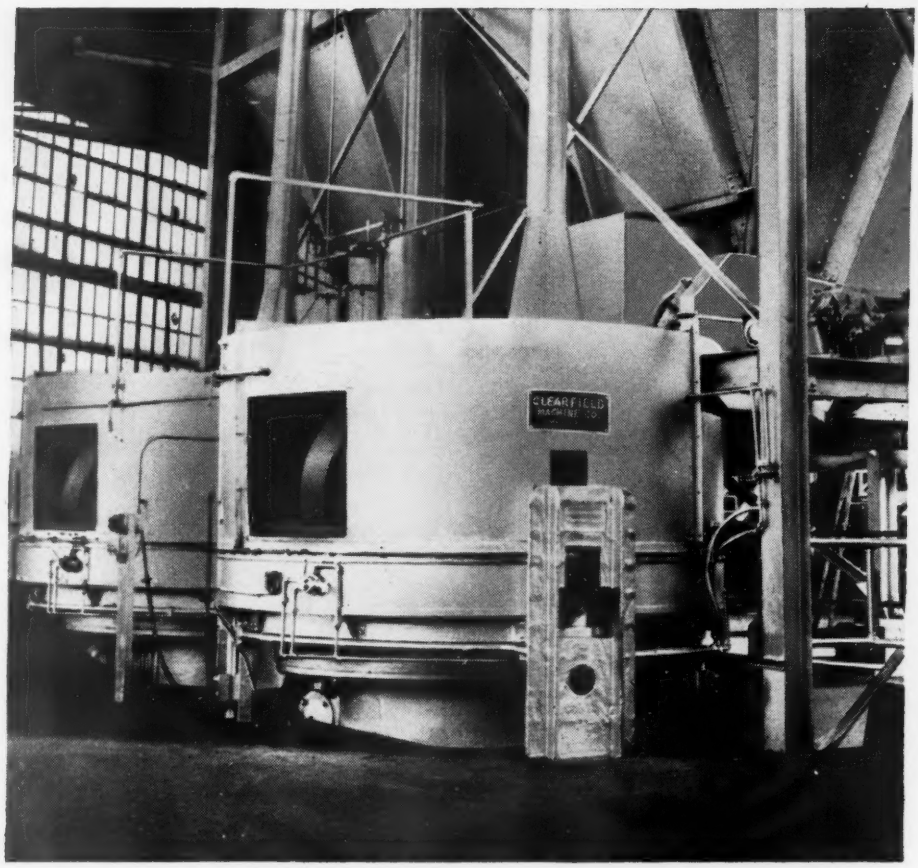
Cores at right illustrate wide range of work that can be done with the Redford No. 4 Core Blower.

Redford IRON & EQUIPMENT CO.

20733 GLENDALE AVENUE • Phone KEnwood 1-8611 • DETROIT 23, MICHIGAN

the

Clearfield Mixer



is engineered, designed and built to *prepare sand properly*

Write today for Catalog No. 83. Get complete details on the tested efficiency of Clearfield Mixers.

Properly prepared sand for best foundry results doesn't just happen. It's the natural result of using correct equipment and a matter of precision in controlling all factors involved. Clearfield Mixers always give you properly prepared sand, and there is a Clearfield for every requirement.

***CLEARFIELD MIXER** mixes, tempers, aerates*

CLEARFIELD MACHINE COMPANY

Clearfield, Pennsylvania, U. S. A.

is a special epoxy resin formulation resistant to acid, alkali, corrosion and abrasion. And the bright color stands out clearly on the dark gray background of the cement subfloor on which the system is installed. Chances of misplaced parts are minimized, and job-site accidents due to tripping and falling are reduced.

These are the features which have made the system a high demand item among electrical contractors. The demand started even before the first catalog of parts was published in October.

But behind the scenes is a foundry story. Design, of course, is important. Some of the features so desirable to electrical contractors also simplify casting techniques. Wide openings, rounded passages and simple contours are some of the factors. Streamlining, too, was necessary to solve a big problem in required section thicknesses which vary from 1/16 to 1¼ in.

Resists Corrosion

Then there was the choice of a high-strength primary aluminum alloy to meet the need of resistance to corrosion, electrolytic action, warping, scratching and gouging. Many laboratory tests were conducted, culminating in field trials with the parts embedded in concrete as they would be on actual installations. Although Howard engineers hesitate to reveal the exact alloy composition, they do say that it closely resembles ASTM alloy B26-52T-S5A for sand castings and ASTM B108-52T-S5A for permanent mold work. Composition of these alloys is a maximum of 0.10 Cu, 0.80 Fe, 0.05 Mg, 0.20 Zn, 0.30 Mn, 0.20 Ti, 0.15 others with Si between 4.5 and 6.0.

Either permanent mold or sand molding techniques are used, depending upon the part. Sands are so blended as to give a smooth finish to avoid damage to the wire covering as the wire is pulled into place in the ductwork system. Also a smooth surface takes the synthetic resin coating better. All parts are cast to close tolerances to minimize the use of sealing compounds for water tightness. Semisoft Neoprene gaskets are cemented in place on the cover openings of junction boxes so that covers will make a watertight seal.

Castings are sand blasted in a table machine and the gating systems removed with band saws and grinders. Very little machining is done. Inspection consists of visual and dimensional checks, and x-ray and Zyglo techniques are used on a sampling basis. In other words, the

Banish errors

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Toledo Printweigh Scales meet your needs today for *closer cost control!* Stop human errors in reading, remembering, recording... provide accurately printed weights with split-second speed ... accurately recorded!

Printweigh Scales available in a full range of capacities for ticket, sheet or strip records. *44 new features* include . . . new clean-line design . . . double-pendulum mechanism in one-piece sector design . . . lifetime fulcrum. Send for new condensed catalog No. 2001. Toledo Scale Co., Toledo 1, Ohio.

ANOTHER COST-SAVING TOLEDO

The *Speedweigh* gives you a quick accurate check on package uniformity . . . and has a multitude of general purpose uses as well. 3 sizes—to 5 lb., to 20 lb., to 50 lb.

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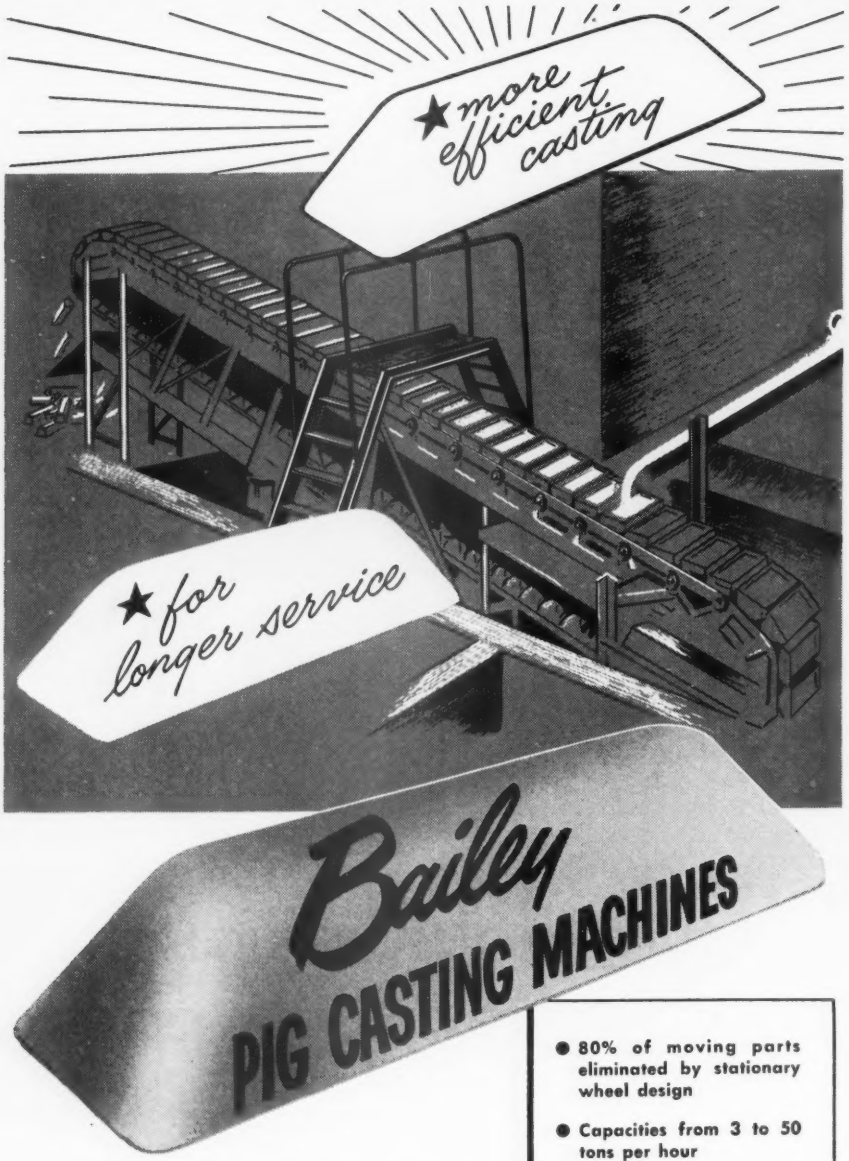
HEADQUARTERS FOR SCALES



Bailey
PIG CASTING MACHINES

- 80% of moving parts eliminated by stationary wheel design
- Capacities from 3 to 50 tons per hour
- Lengths: 15 to 125 feet, in multiples of 5 feet
- Furnaces can be tapped direct into the machine—eliminating the furnace-to-ladle operation.

Foundries and small capacity metal producing operations particularly benefit from the simplified design of these machines. The unique stationary wheels are the basic reason why the machines assure much more efficient casting and far longer service. In this design the idler wheels are mounted on the frame, rather than on the moulds, thus keeping them as far as possible from the hot metal. Completely self-contained, the unit includes the machine proper, a motor gear unit, and a variable speed reducer and drive.

WILLIAM M. Bailey COMPANY
ENGINEERS
LEADERSHIP THROUGH QUALITY
1221 BANKSVILLE ROAD PITTSBURGH 16, PA.

same high statistical quality control methods are used here as apply to castings produced in all the Howard foundries.

Then the parts are cleaned by dipping in oleum spirits, drained and blown dry. To assure complete dryness the parts are pre-baked at 150°F and cooled for about 10 minutes before the bright yellow coating is applied by dipping. Parts are loaded on shelves on a monorail conveyor which carries them through a horizontal, gas-fired oven for drying at 300-350°F. They are in the oven for 30 minutes.

After a final visual inspection, the parts are ready for stocking or shipping.

Aluminum Association Holds Annual Business Meeting

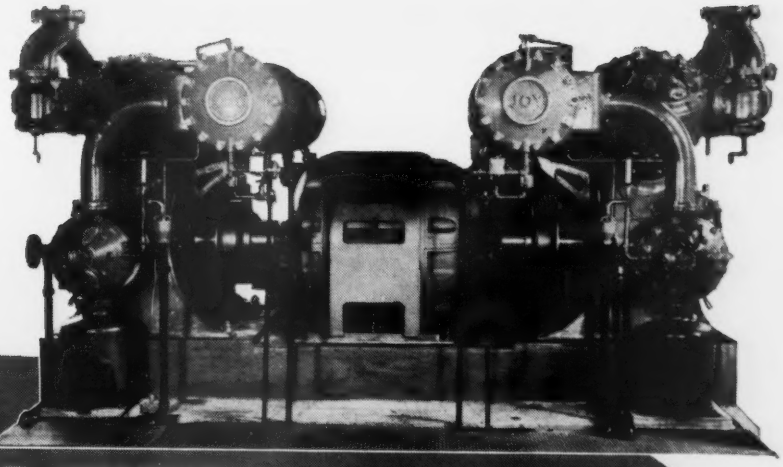
At the annual meeting of the Aluminum Association, held recently in New York, Everett G. Fahlman, the Permold Co., Medina, O., was elected president, succeeding D. A. Rhoades, Kaiser Aluminum & Chemical Corp., Oakland, Calif. Arthur V. Davis, Aluminum Co. of America, New York, was re-elected chairman of the board, Donald M. White was re-appointed secretary and treasurer, and Mildred I. Golden, assistant treasurer.

Vice presidents elected include: L. M. Brile, Fairmont Aluminum Co., Fremont, W. Va.; Frank B. Cuff, Aluminum Co. of America, New York; and George N. Wright, Harsch Bronze & Aluminum Foundry, Cleveland.

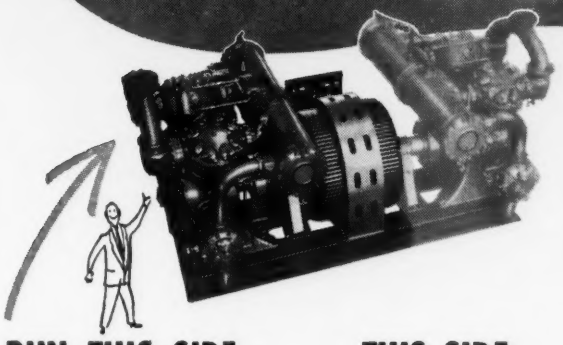
In the Foundry Division, J. Frank Seeley, Bohn Aluminum & Brass Corp., Detroit, was elected chairman, and O. L. Earl, Acme Aluminum Foundry Co., Chicago, vice chairman. E. G. Fahlman was re-elected division representative on the board of directors, and D. M. White was renamed treasurer of the division.

Plan Second Material Handling Course for Lake Placid, N. Y.

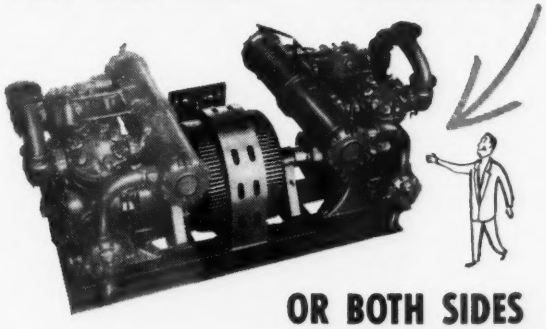
Handling equipment, charts, plant layout, handling techniques, warehousing, automation and other subjects will be covered at the second annual Material Handling Training Conference. Only fifty can be enrolled in the course, which is scheduled for June 19 to July 2, at the Lake Placid Club, Lake Placid, N. Y. Cost of tuition, room and board for the two weeks is $850. Further details may be obtained from James R. Bright, director, Material Handling Training Conference, 56 Robbins Road. Lexington, Mass.



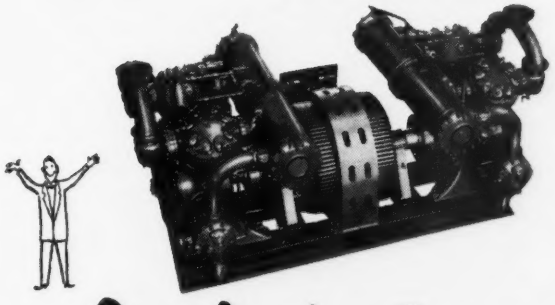
The JOY WN-114 TWIN is a 2-in-1 COMPRESSOR



RUN THIS SIDE... ...THIS SIDE



OR BOTH SIDES



SAVES FLOOR SPACE The Joy WN-114 Twin is actually two heavy duty, semi-radial compressors operating from a single motor. Because of the compact design and one power source, they make the most of limited floor space. The package-type units are delivered ready for mounting on a simple rectangular foundation.

USE ONLY WHAT YOU NEED Either compressor may be run alone by simply disconnecting its twin at the flexible coupling. As demand rises, the twin can be reconnected quickly, easily. This exceptional flexibility is ideal for plants where airpower demands vary greatly.

STANDBY INSURANCE The twin arrangement guarantees an "ace in the hole." When a conventional single compressor breaks down, its production stops completely. Under like circumstances, the Joy Twin continues at 50% capacity.

SAVES MAINTENANCE, OPERATING COSTS The WN-114 Twin is equipped with field-replaceable crosshead and cylinder liners and one-piece, box-type, tinned crossheads that require no adjustment. Patented "Dual Cushion" valves feature large area and low lift to give long, efficient, quiet operation. Displacement range is from 2372 to 3896.

For complete details on Joy WN-114 Twin Compressors, see your Joy representative, or write ***Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.*** In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*

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SPECIALISTS IN THE COMPRESSION AND MOVEMENT OF AIR AND GASES SINCE 1885

WADT-5498

FOUNDRY DEVELOPMENTS

By EDWIN BREMER
Metallurgical Editor

COLOR appeal and durable surface protection are added to the inherent advantages of aluminum castings through application of vitreous enamel coatings, according to Monarch Aluminum Mfg. Co., Cleveland. The procedure for applying enamel coatings to castings was developed by the firm's engineers after 15 months' investigation based on work by du Pont and Ferro Enamel in processing aluminum sheet. Problems included control of casting deformity under firing temperatures, engineering of low-melting point frits for aluminum, and improvement of resistance to shock, impact and stress. Vitreous enamel coating is said to be resistant to alkalis, acids and detergents, thermal shock, salt-water corrosion, and abrasion. It also adds to the dielectric properties.

Lubricant Resists Heat

THROUGH modification of the rugged silicone oil molecule, Westinghouse engineers have developed a lubricant which is said to be outstanding in both thermal and load-bearing properties. Fluid has satisfactorily passed thermal and viscosity tests ranging from minus 65° to 500° F. Steel-to-steel bearing load tests have shown excellent lubricating properties up to 107,000 lb per square inch of bearing area. Lubricant will be manufactured by Dow Corning.

Advocates Rapid Pour

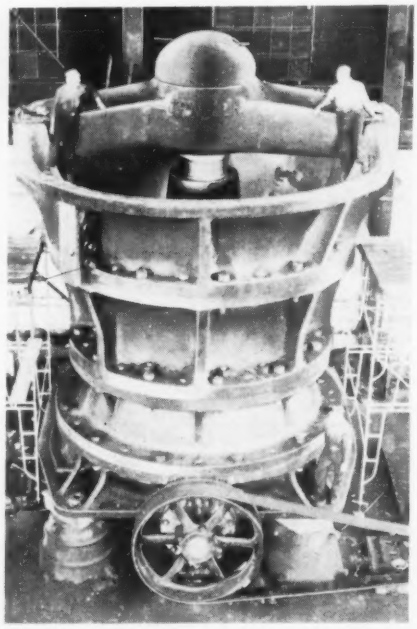
DISCUSSING "Gas Effects in Castings", Frederick G. Sefing in the Fall-Winter, 1954-55 issue of *Pig Iron Rough Notes* suggests the following remedies. Provide flow-off vents on all dead ends and topmost portions of the mold. All cores and hot spots should be adequately vented to carry off gas developed at the metal-sand interface. Clean metal should enter the mold cavity. All castings, especially the pressure type, over about 50 lb, should be poured in 15 to 20 seconds, even though the casting weight may be up to a ton.

High Temperature Work

CHROME carbide, grade 608, developed by Carboloy department, General Electric Co., is proving to be an excellent structural material for load applying members and specimen grips employed in high-temperature transverse rupture and tensile stress rupture testing, for anvil and Brale extensions in high-temperature testing, and as brinell balls in elevated temperature hardness evaluations. Test of the chrome carbide indicate it has good strength at temperatures as high as 1500° F, resists creep and deformation at temperatures of 1800° or higher, and is very resistant to oxidation at 1800° F. Hardness at room temperature is 89 Rockwell A, and 76 Rockwell A at 1500°. Transverse rupture strength is 100,000 psi at room temperature; 120,000 psi at 1500°, and 100,000 psi at 1800° F.

Steel Castings Crush Ore

CAST steel components are used in five gyratory crushers being built for use in taconite beneficiation. The largest of these will crush 4400 long tons of hard taconite ore per hour. Outside diameter of the largest crusher is over 20 ft; its height from



foundation to the top is 24 ft. An 850-hp electric motor drives the 102-in.-diam crusher head which reduces the taconite to 12-in. size.

First plans are to operate this crusher 15 hr a day for a production of 66,000 long tons. The four smaller crushers with 70-in.-diam crushing heads reduce the ore to 5 in. Erie Mining Co., operated by Pickands Mather & Co., placed orders for the crushers with the Traylor Engineering & Mfg. Co., Allentown, Pa. Erie will use the crushers in a new beneficiation plant it is erecting near Aurora, Minn.

Alcohol for Atmosphere

STUDY at Midwest Research Institute, Kansas City, Mo., according to Milo Stutzman in the Jan. 17 issue of *Steel,* indicates that gases developed by vaporizing ispropyl alcohol-water solutions provide suitable atmospheres in heat treating steels. The atmospheres produced contain large percentages of hydrogen and carbon monoxide with low percentages of carbon dioxide, water vapor and hydrocarbons. The isopropyl alcohol-water solutions can be adjusted to supply atmospheres for carburizing mild steels or for protecting medium and high-carbon steels from decarburization.

Worthwhile Conversion

CATALYTIC units which convert carbon monoxide-bearing exhaust fumes to harmless carbon dioxide and water vapor are available for attachment to gasoline-powered trucks. Units contain small porcelain rods coated with activated alumina and platinum which oxidizes the carbon monoxide to dioxide. Number of catalytic cartridges in a unit is based on the engine piston displacement.

Little Goes Long Way

HOT spray painting is said to offer many advantages. There is less than 4 per cent viscosity change in the paint consistency between 150 and 156° F. Paint film deposited has less solvent content, giving greater film build. Low solvent hot spray provides reduced shrinkage and gives greater coverage. Overspray is reduced, and sags and runs are practically eliminated. Process permits faster application, and a higher gloss is obtained with hot spray painting.

Inside Stuff

INTERESTING concept on penetration of steel into sand recently described by Emmons and Bach involves desiliconization of sand by steam forming voids. Those then are filled with iron carbonyl generated by molten steel, carbon monoxide and pressure which later decomposes into metallic iron. Still later with high temperature that iron melts permitting entry of molten steel.

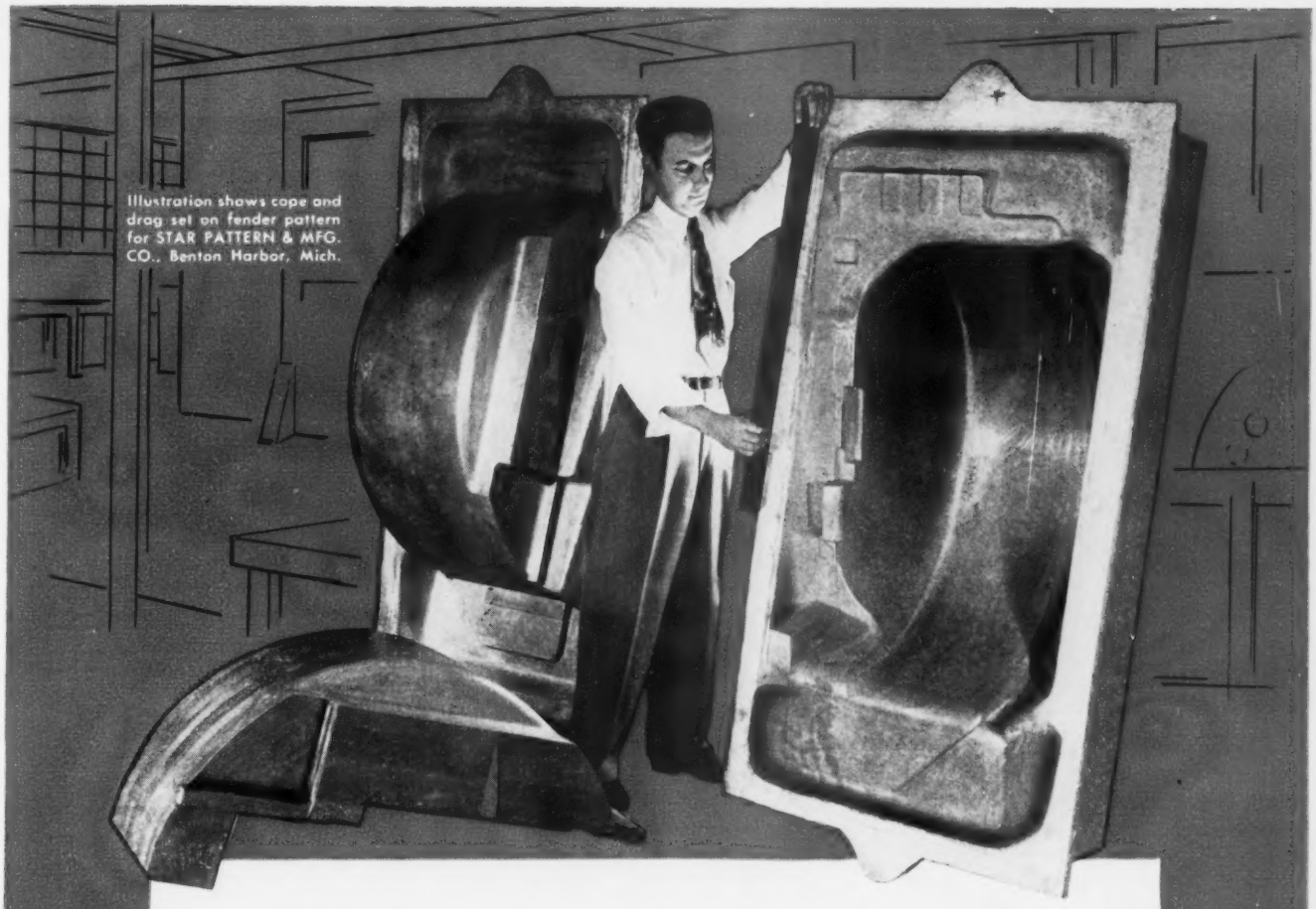


Illustration shows cope and drag set on fender pattern for STAR PATTERN & MFG. CO., Benton Harbor, Mich.

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Because they have been a profit maker for several hundred of the leading foundries all over America...

For example, when you use Accurate cope and drag sets you get clean smooth partings. Patterns as cast are straightened and have correct alignment marks. This helps to decrease your finishing costs.

Maintenance costs are much lower because you get longer life..

Wherever used, Accurate cope and drag sets have been the means of producing greater volume of castings at lower costs.

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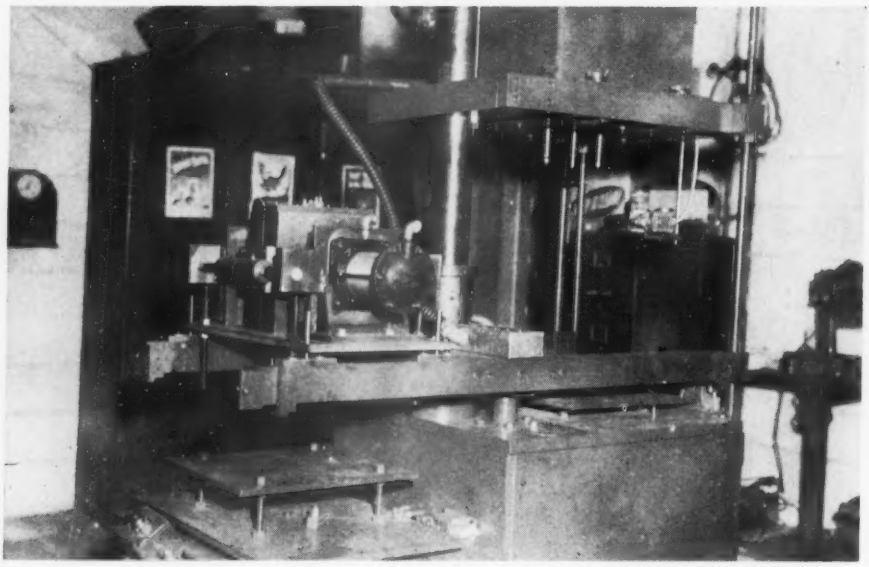


Shell Machine: C & S Products Co., 14841 Meyers Rd., Detroit 27, Mich.—Shell machine reportedly can produce shell molds or shell cores, separately or simultaneously, by blowing phenolic resin coated sands at low pressures into electrically heated coreboxes, patterns or die cavities. Curing begins almost immediately and cores or molds are said to be ready for use in 20-30 seconds. Drier plates and ovens are eliminated. Hollow cores and contoured molds can be made. By using multiple cavity coreboxes, 240 cores per hour are possible, according to the manufacturer.

All operations are controlled by solenoid valves. Heater plate temperature is thermostatically controlled. Machine is a two-station operation requiring 24 sq ft of floor space. Stations operate at 180 degrees to each other, and operator works from one position. Standard machine can accommodate coreboxes or patterns up to 15 x 20 in. and up to 14 in. deep. Unit is adaptable to vertical or horizontal partings. Universal blowheads can be furnished.

For More Details Circle No. 1—Page 223

Trolley Conveyor: Rapistan-Keystone Inc., 21750 West Eight Mile Rd., Detroit 19, Mich.—Overhead trolley conveyors for medium duty use are prefitted and match-marked at factory to simplify installation without special crews. Standard components of I-beam track, drive and take-up units, trolleys and drive chain can be made up to fit all types of operations. Speed of travel can be timed to fit desired production or processing cycles. Conveyor is open-track type. Chain rolls on a trolley instead of being pulled inside the track.

For More Details Circle No. 2—Page 223

Plaster Release: Kindt-Collins Co., 12651 Elmwood Ave., Cleveland 11, O.—Liquid plaster release agent that is said to release plaster casts from wood, metal or plaster patterns and coreboxes is available in spray cans. Release agent does not form fillets and there is no buildup to affect accuracies, according to the supplier. Liquid can be applied by pressing a button on the can and directing the spray to the proper surface.

For More Details Circle No. 3—Page 223

Vacuum Furnace: F. J. Stokes Machine Co., 5500 Tabor Rd., Philadelphia 20, Pa.—Vacuum melting and casting furnace suitable for moderate size production of high-purity metals or for experimental and pilot-scale work has a melting capacity of 50 lb of steel or other metals. Furnace can be equipped with a tilting crucible and a turntable on which multiple molds can be supported for semicontinuous casting. It can be fitted for casting by bottom pouring. Alloy additions can be made, samples taken, and temperatures measured by thermocouples without breaking vacuum in the chamber. Emptying the addition bucket, moving the crucible cover, dipping and raising the sampler, tilting the crucible, rotating the mold table, and preheating or cooling the molds are actuated mechanically by manual controls from outside the chamber. Coaxial power leads carry a maximum of 50 kw, either of high-frequency current for stirring needed during induction heating or of low-frequency current for resistance heating.

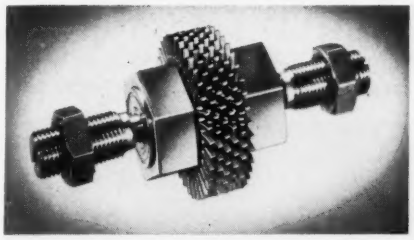
For More Details Circle No. 4—Page 223

Core Vents: Harry W. Dietert Co., 9330 Roselawn Ave., Detroit 4, Mich.—Powdered metal core vents for venting patterns and coreboxes are of porous metal mounted in a brass ferrule flush with the end of the ferrule to form a continuous surface on the pattern. Disk allows air to escape but surface is very fine and prevents sticking so it can be located in critical areas without leaving an impression on the finished shell. Ferrule's open end is beveled to aid insertion in the pattern. Vents can be supplied in ½, ⅜, and $\frac{5}{16}$-in. OD sizes.

For More Details Circle No. 5—Page 223

Dresser Cutter: Besly-Welles Corp., Beloit, Wis.—Dresser cutter has slim "fingers" which reportedly pick abrasive grain from the surface of grinding discs being dressed. A square arbor for the cutter assembly holds cutters in place with teeth in staggered position to prevent chewing the arbor spindle. Manufacturer claims almost frictionless rotation of cutter assembly is assured

For More Details on These Items
Use Reply Card—Page 223



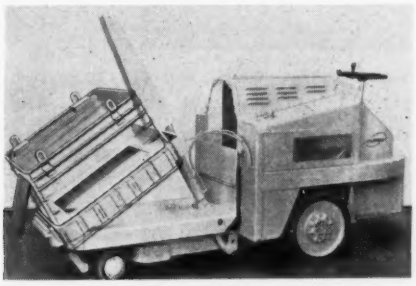
by sealed ball bearings holding the square arbor. Buttons pressed into the side of each individual cutter eliminate need for spacing washers. Six cutters make up the complete cutter assembly.

For More Details Circle No. 6—Page 223

Die Casting Machine: DCMT Sales Corp., 164 Duane St., New York 13, N. Y.—Redesigned zinc alloy die-casting machine pot including integral gooseneck and hardened sleeve and nozzle features company's machine. Increased holding capacity of the pot increases the average cycling speed of the machine, according to the manufacturer. Average working speed of the machine is said to be between 700 and 900 shots per hour on production runs. Company also prefabricates die sets in all sizes containing sprue pin, sprue hole, spherical nozzle seat, clamping slots, tie bar holes, ejector box tie-in-holes, locating dowels and tie bar nut recess, with all surfaces machined and ground parallel.

For More Details Circle No. 7—Page 223

Skid Box Dumper: Elwell-Parker Electric Co., 4205 St. Clair Ave., Cleveland 3, O.—Hydraulically powered attachment for automatic end dumping of skid boxes can be used with electric or gas powered trucks with capacities of 4000 to 10,000 lb



and larger. Loading and dumping operations are automatic. Truck drives beneath the skid, platform is raised, lifting the load clear of the floor. Skid is delivered to dumping point where rear of the platform is raised to dump the load. Skid used must have either an open end or door-like opening to permit contents to spill out when tilted. Dimensions of the platform can be designed to fit individual operating requirements. A double-acting hydraulic cylinder controlled by a plunger type valve operates the auxiliary tilting platform.

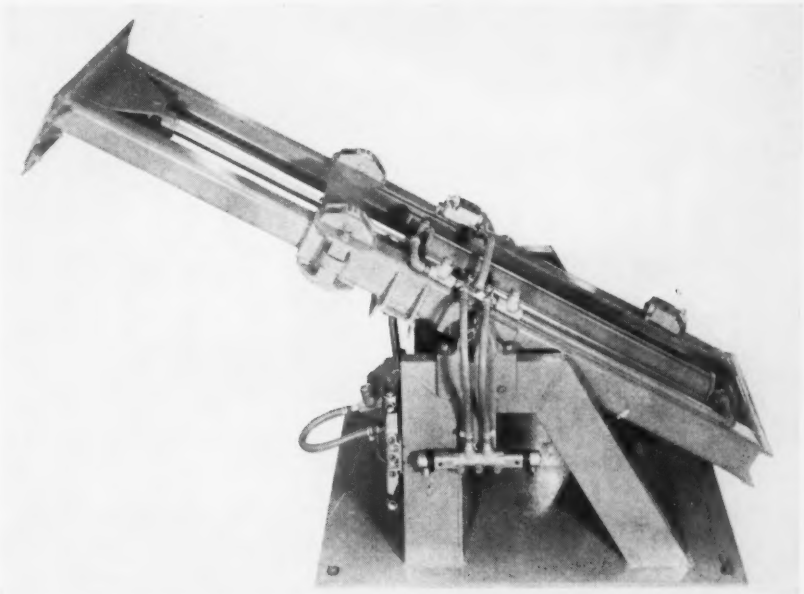
For More Details Circle No. 8—Page 223

Tumbling Barrel: Rampe Mfg. Co., 3320 St. Clair Ave., Cleveland 14, O.—Drum with three removable covers is for use on company's barrel finisher. Standard barrels with three openings are available and individual racking fixtures can be adapted to them to meet specific requirements. Use of extra covers permits tumbling a wide variety of parts in the same barrel. Drum measures 10¾-in. by 23 in. diam. Drums are available separate from the unit.

For More Details Circle No. 9—Page 223

Drum Rack: Star Welding Co., 1054 East 134th St., Cleveland 10, O.—Lightweight, all-steel welded rack is designed to raise drum spouts to

Automatic Pusher Has a 6-Second Cycle



PUSHER is designed to cut labor costs in handling molds, flasks or castings in automatic or semi-automatic foundry operations. Dust-proof solenoid valves, actuated by movement of a conveyor, position of molds or other motivating devices, automatically control action of the pusher. Manual control also is possible. Operating cycle begins with pusher in horizontal, retracted position. Control devices activate an air cylinder which moves the mold or casting. As the pusher blade moves over the conveyor, a wiper blade attachment removes any sand which may have accumulated on the conveyor.

At the end of the forward stroke, controls cause a second air cylinder to raise the pushing mechanism into an inclined position (as shown above) to avoid possible interference with approaching molds or flasks. Pusher then retracts in anticipation of the next pushing cycle. When pusher is retracted at end of its return stroke, it returns to a horizontal position to await the signal for the next cycle of operation. Cycling speed can be as fast as one stroke every six seconds.

Standard designs have a pushing force of 1200 lb, which can be modified to meet individual conditions. Several types of control equipment are available. A safety feature automatically raises the pusher to the inclined position in case of power system failure. The machine is manufactured by Air Compressors & Motors Inc., 3501 Croton Ave., Cleveland 15, O.

For More Details Circle No. 10—Page 223

Indianapolis Foundry Coke

. . . highest quality
. . . uniform performance

For maximum metal temperatures with minimum coke per charge—specify Indianapolis Foundry Coke.

Always high in carbon content, always low in sulphur . . . . low in ash . . . . uniform carbon absorption.

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Four sizes—top and bottom limits 1"—to fit *your* cupola operations. Specify Indianapolis Foundry Coke for top performance.

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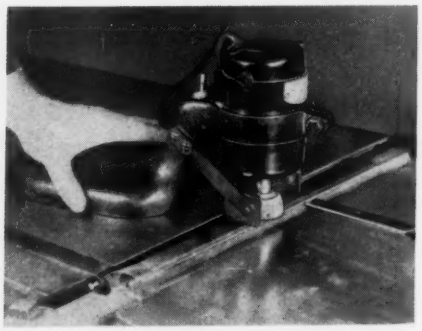
pouring heights or for storage. A fully filled 55-gal drum can be supported. Rack is collapsible by removal of one bolt.

For More Details Circle No. 11—Page 223

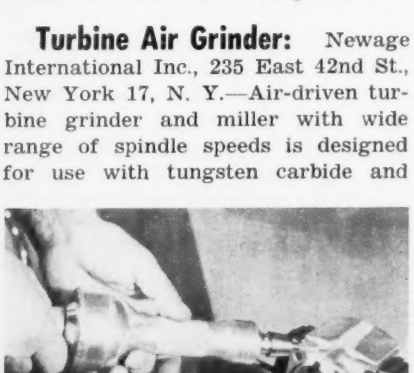
Blade Sharpener: Foster Tool Co., 6122 North Milwaukee Ave., Chicago 30, Ill.—Portable jointer blade sharpener assertedly sharpens the



blades of any jointer without removing the blades from the machine. Grinder is operated by sliding it on the jointer table. Amount of cut is determined by raising and lowering the table. No cross bars or power feeds are necessary to drive it across table. A positive index stop and locking device are furnished with each grinder.

For More Details Circle No. 12—Page 223

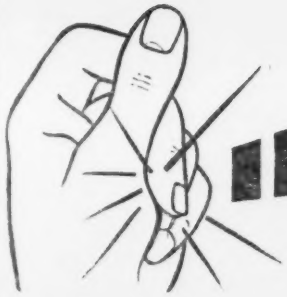
Turbine Air Grinder: Newage International Inc., 235 East 42nd St., New York 17, N. Y.—Air-driven turbine grinder and miller with wide range of spindle speeds is designed for use with tungsten carbide and



high-speed steel burrs, precision grinding points, and abrasive and diamond impregnated wheels. Three sizes to operate at speeds of 55,000, 70,000 and 85,000 rpm at air pressure from 60 to 100 psi are available. Grinders to operate on pressures down to 30 psi can be supplied.

For More Details Circle No. 13—Page 223

Shell Release Agent: Shallway Corp., Connellsville, Pa.—Silicone shell mold release agent is for continuous, routine use in releasing shells during shell mold production. Agent may be diluted with about ten parts of water and may be applied by spraying. Another product avail-



IDEAS FOR FOUNDRYMEN

HERE ARE QUICK REVIEWS OF NEW LITERATURE—available to foundrymen as "idea" and reference information. Readers in the United States and Canada may obtain copies by using the attached cards. Readers in foreign countries should write direct to the manufacturer offering literature.

81. Aluminum Alloys

Federated Metals Division, American Smelting & Refining Co., 120 Broadway, New York 5, N. Y.—New illustrated "Aluminum Casting Alloys Handbook" contains descriptive material on metallurgy and casting practices. Federal, military, Society of Automotive Engineers, Aeronautical Material Specifications, American Society for Testing Materials and Federated Metals specifications are cross indexed. Heat treatment, corrosion and the effect of alloying elements are discussed. Also described are melting, fluxing and related problems of die casting.

82. Flask Guides

Goehring Foundry Supply Co., 919 West Fifth St., Cincinnati 3, O.—Flask guides and matchplate lugs are pictured in an illustrated folder which shows complete assembly and each individual part. Advantages of V-shaped grooves in forming a close union and preventing shifts are described.

83. Refractories

Carborundum Co., Refractories Division, Perth Amboy, N. J.—High temperature refractories made from bases of silicon carbide, aluminum silicate and fused alumina are described in a new 24-page booklet. Characteristics, fields of application, and availability of each of the materials is given.

84. Cranes

Whiting Corp., Harvey, Ill.—Booklet 80 presents a wide variety of handling jobs performed by overhead cranes. Special features of the company's cranes are pointed out and photos show a variety of installations.

85. Brinell Hardness Tester

Steel City Testing Machines Inc., 8817 Lyndin Ave., Detroit 38, Mich.—Form KE 1154 gives complete specifications and discussions of features which make possible high speed production testing and automatic operation when required. Colored lights which signal relative hardness are described.

86. Barrel Finishing

Minnesota Mining & Mfg. Co., 900 Fauquier St., St. Paul 6, Minn.—Instruction booklet on barrel finishing describes basic steps involved in making trial processing runs and makes recommendations for selection of media and compounds. Specific recommendations for barrel speeds, water level, time cycles and barrel loading are listed.

87. Graphite Products

Great Lakes Carbon Corp., Electrode Division, 18 East 48th St., New York 17, N. Y.—Manufacturing steps in the making of graphite electrodes, anodes, molds and specialties are given in an illustrated booklet. All divisions of the company are described.

88. Armored Motors

General Electric, Schenectady 5, N. Y.—Information on performance and maintenance features of heavy-duty armored motors is given in bulletin GEA-4654C. Horsepower ratings and mechanical data are included in the booklet.

89. Combustion Tubes

Harry W. Dietert Co., 9330 Roselawn Ave., Detroit 4, Mich.—Combustion tubes, boats and shields for laboratories are pictured in an illustrated price list.

90. Dust Collectors

Van-Truer Co., 12600 Beech Rd., Detroit 23, Mich.—Dust collectors, spray booths, washers and special equipment are described in a four-page folder.

91. Coated Abrasive Grinding

Behr-Manning Corp., Division of Norton Co., Dept. PD-54, Troy, N. Y.—Techniques of grinding and polishing with coated abrasives are cov-

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ered in a 60-page digest of technical papers which have appeared in leading periodicals of production engineering in both the metalworking and woodworking fields. Over 120 photographs picture various production processes.

92. Epoxy Resins

Bakelite Co., Division of Union Carbide & Carbon Corp., 30 East 42nd St., New York 17, N. Y.—New booklet tells of the use of epoxy resins for tools, dies, jigs, fixtures, patterns and models. Data on storage life and handling of epoxy resin compounds, their working life, mixing, fillers and cleaning equipment are explained in a section on compounding.

93. Planning Services

Giffels & Vallet Inc., L. Rossetti, Associated Engineers & Architects, 1000 Marquette Bldg., Detroit 26, Mich.—Services for the engineering and planning of building construction projects are explained in an illustrated booklet. Features of completed projects are shown.

94. Materials Testing

Soiltest Inc., 4520 West North Ave., Chicago 39, Ill.—Full line of apparatus for engineering tests of soils, concrete, asphalt and construction materials is described in an illustrated 104-page catalog. Discussion of test apparatus for foundry sands is included.

95. Electric Precipitators

Research-Cottrell Inc., Bound Brook, N. J.—General principles of electrical precipitation are described in a 28-page bulletin. Installation photographs and diagrams supplement the text and a section is devoted to a cupola installation.

96. DC Motors

Reliance Electric and Engineering Co., 1088 Ivanhoe Rd., Cleveland 10, O.—Line of industrial direct current motors featuring fast and accurate response is introduced in bulletin C-2002. Features of the motors are illustrated and estimating dimensions and selection data are included.

97. Electric Hoists

Yale & Towne Mfg. Co., 11000 Roosevelt Blvd., Philadelphia 15, Pa.—Wire rope electric hoists, in sizes from ¼ to 15-ton capacity, are described in brochure P-495-A. Information is given by illustrations, cutaway photographs, charts and diagrams.

98. Steam Heating

Steam Heating Mfrs. Association, 450 East Ohio, Chicago 11, Ill.—Characteristics and advantages of steam heating are described in a 16-page booklet. An outline for steam heat system specification provides a checklist guide for a designer to follow in specifying a steam heating system. Problems of heat control maintenance, repair and alteration are included in the discussion.

99. Rust Prevention

Rust-Oleum Corp., 2799 Oakton St., Evanston, Ill.—Information on rust prevention, surface preparation and the application of primers, machinery and implement finishes, sealers, thinning oils and floor and masonry coatings is given in 1955 General Catalog. Color chips of 98 different products are featured.

100. Plaster Mold Castings

Hale Foundry Co., 1680 Fall St., Cleveland, O.—Illustrated booklet explains how parts in limited runs are produced in plaster molds to achieve precision castings at low cost. A graph shows quantity levels at which parts can be cast most economically in plaster molds.

101. Safe Crane Electrification

Insul-8-Corp., 1285 Rollins Rd., Burlingame, Calif.—New catalog describes enclosed conductor systems for the safety electrification of cranes and monorails. An illustrated parts list, engineering data and an explanation of insulated systems is included in catalog 8-54.

102. Blast Cleaning

Pangborn Corp., Hagerstown, Md.—Bulletin 227 describes an impeller-type rotor used in blast cleaning machines. Construction features of the unit, its operation and ease of maintenance are described. Large illustrations aid in the explanation.

103. Grinding Wheels

Colonial Abrasive Products Co., Sixth and Harry Sts., Conshohocken, Pa.—Reinforced grinding wheels for high speed portable grinding which have safety rings in the grinding portion of the wheel are described in an illustrated brochure.

104. Sling Chains

Columbus McKinnon Chain Corp., Tonawanda, N. Y.—Data book 100 includes diagrams, charts and tables on standard and special styles of sling chains and attachments in a 32-page booklet. Hooks, links and rings also are covered.

105. V-Belt Drives

Worthington Corp., Mechanical Power Transmission Division, Oil City, Pa.—New 100-page manual, V-1400-E2F, covers multi-V-drives. Topics discussed and tabulated include rating, drive selection, effective diameters and service factors.

106. Foundry Coke

Philadelphia Coke Co., Subsidiary of Eastern Gas & Fuel Associates, 4501 Richmond St., Philadelphia 37, Pa.—Operations in the manufacture and inspection of coke are pictured in an illustrated folder. Sizes available are shown.

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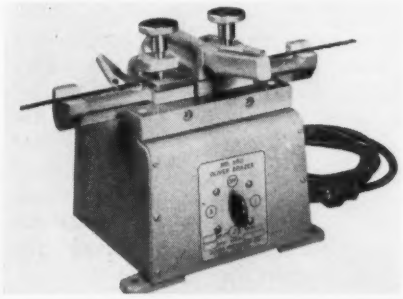
able is an oil for curing or breaking in new patterns. Patterns are cleaned thoroughly with commercial cleaner before brushing on curing oil. Pattern is then heated to about 450° F for half an hour. Intricate patterns require a longer break-in.

For More Details Circle No. 14—Page 223

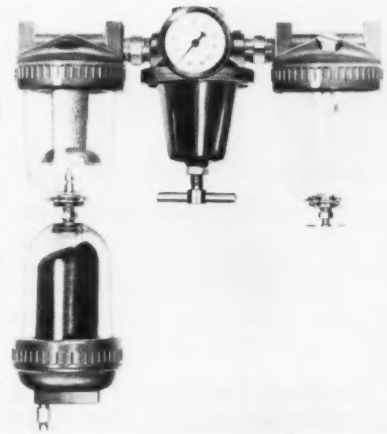
Electric Brazer: Oliver Machinery Co., Grand Rapids 2, Mich.—Electric brazer for band saw blades uses electric resistance heat for melting the soldering metal. Top bed is a ma-



chined and permanently located back rail with clamping plates and clamps to hold the saw ends. Two spring devices hold back edge of blade against back rail to insure a straight braze. Unit is furnished for single phase 50 or 60 cycle, 110, 220 or 440 v ac as specified. For two or three phase power lines, 50 or 60 cycles, special wiring from switch to power line is essential. It is not made for use with direct current.

For More Details Circle No. 15—Page 223

Pneumatic Control: Arrow Tools Inc., 1906 South Kostner Ave., Chicago 23, Ill.—Filter and trap is for automatic conditioning and control of compressed air used in the operation of pneumatic-powered equipment. By introducing com-

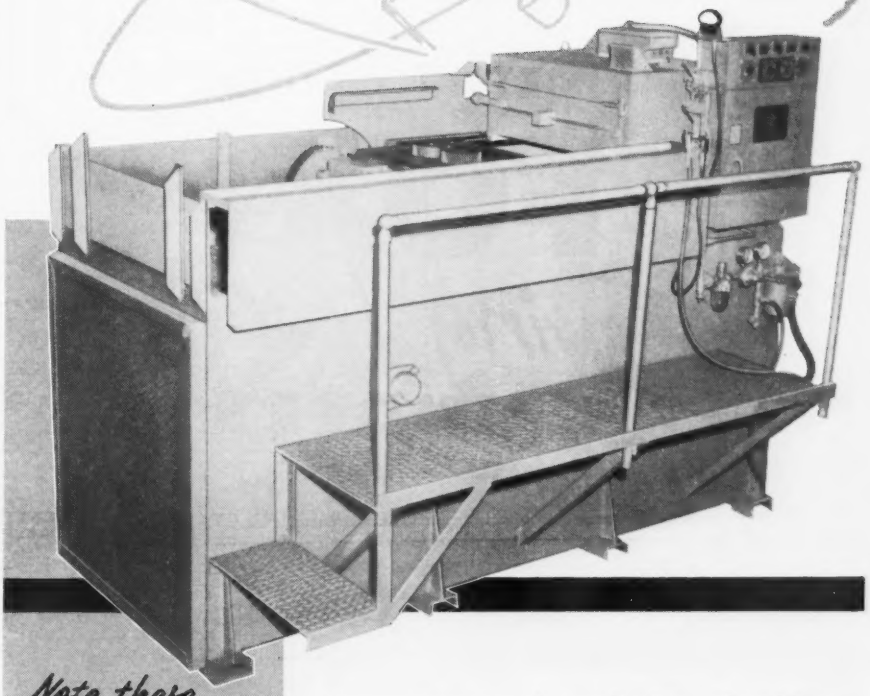


pressed air into the filter pipe rust, scale, dust and free moisture are removed and entrainments are deposited in the filter bowl. Trap collects the accumulated moisture and ejects it into a service drain. A pressure regulator controls operating pressure of the compressed air to insure effi-

Precision Shell Molds

In less than 70 Seconds

at the push of a button!



Note these Features!

- Infra-red radiant heat curing oven
- Automatic shell ejection system
- Permanent built-in infra-red pattern heating
- Interlocked for safe operation
- Adjustable pneumatic controls
- Cushioned air cylinders
- Machine can be pitted below floor level or used with platform
- 20″ x 26″ pattern area x 8″ depth
- Automatic louvers for vertical drop of sand
- 700 lb. sand capacity

Increase your foundry production, reduce labor costs, sand handling, metal wastage and machining operations, and put precision shell molding on a *push button* production basis —with the *new* . . .

SHELL-O-MATIC
Automatic Shell Molding Machine

A complete cycle from heating of pattern to inspection of finished precision shell takes *less than 70 seconds* with this fully automatic machine. Unskilled personnel can easily handle its most simple operation and yet produce 50 or more completely cured shells per hour! Pattern changeover is a matter of minutes. Quickly installed—one electrical and one air connection and machine is ready for operation.

Write, wire or phone for complete details showing how SHELL-O-MATIC can reduce costs and increase production in *your* foundry.

SHELL-O-MATIC, INC.
26-32 Avenue L, Newark 5, N. J. — Office
146 Coit St., Irvington, N. J. — Manufacturing

ciency of air-powered tools, cylinders, valves or other devices. Clean, dry, controlled air then passes into a lubricator where automatically and in proportion to air volume a fine fog of oil is injected into the air line for lubrication of the equipment. Control is designed to handle standard range of air flows in pipe line sizes of ¼ through 1 in.

For More Details Circle No. 16—Page 223

Spectrometer: Baird Associates Inc., 33 University Rd., Cambridge 38, Mass.—Company has modified its direct-reading spectrometer to provide fast spectrochemical analysis on the foundry or metal fabricating floor. Modified version will give percentage readings on six elements in a metals mix in a pushbutton operation which can be completed in less than two minutes. It is designed to give continuous quality control analyses of a metal production stream and is adaptable for use with mixtures containing bases of either ferrous or nonferrous metals. It is designed for the smaller plant or for an independent foundry operation in a larger installation.

For More Details Circle No. 17—Page 223

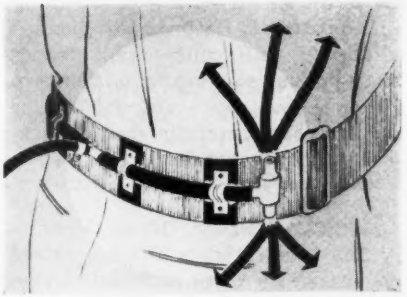
3 IMPORTANT FEATURES of

FOX Swing Frame GRINDERS

- **Perfect center balance** of wheel and motor ensures grinding ease and efficiency.
- **"Worker safety"** is carefully provided.
- **Greasing** required only once every six months . . . guaranteed for two years against repairs, exclusive of electrical equipment.

FOX GRINDERS, Inc.

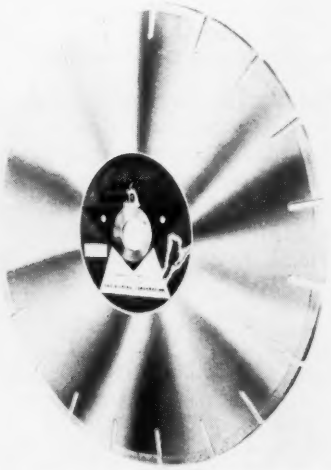
OLIVER BUILDING PITTSBURGH 22, PA.



Ventilation Belt: Standard Safety Equipment Co., 232 West Ontario, Chicago 10, Ill.—Lightweight ventilation belt containing fittings to distribute air from an external source through protective garments is said to carry away body perspiration and provide a cooling effect. Belt weighs 12 oz and can be slipped on in a few seconds. It is claimed to be instantly adjustable to any waist size and rides lightly and easily just above the belt line.

For More Details Circle No. 18—Page 223

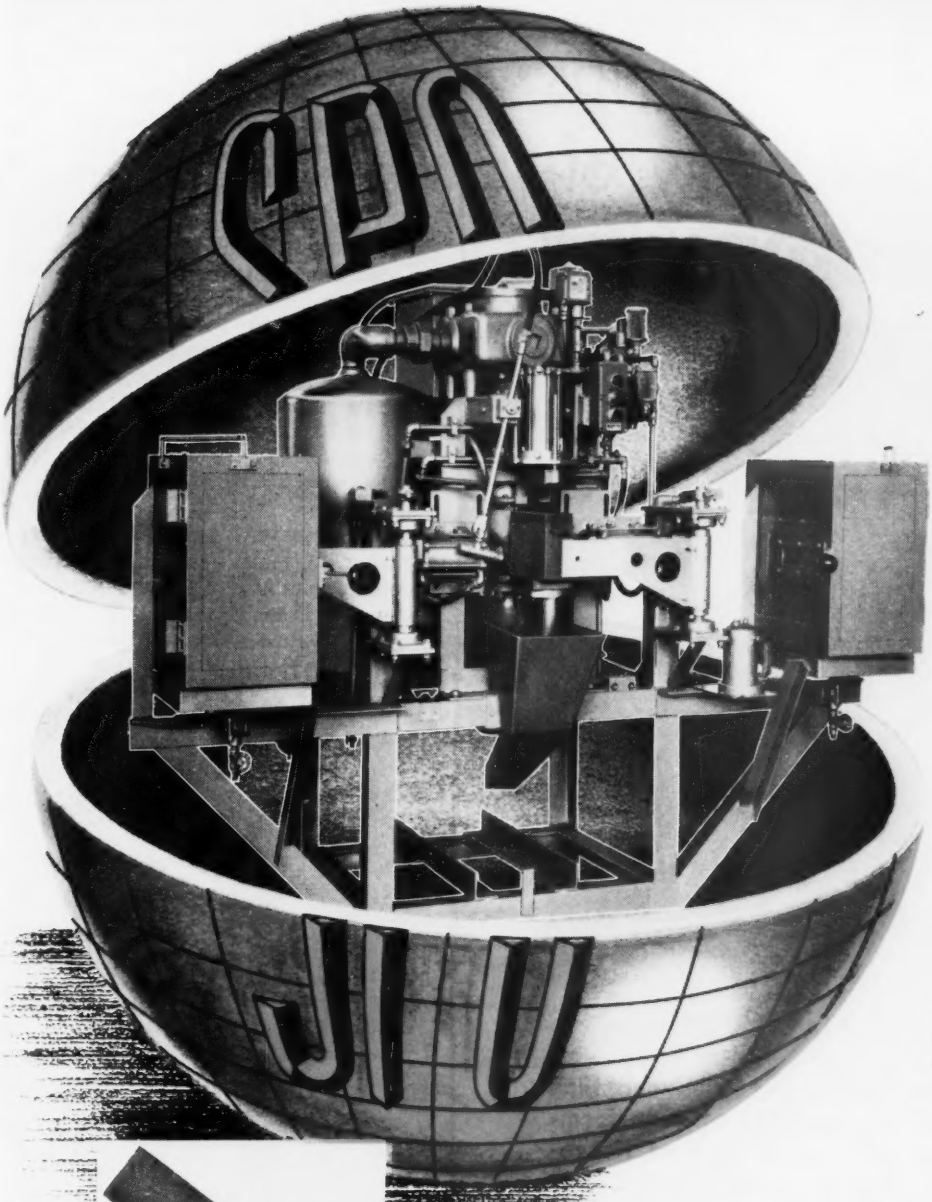
Diamond Blade: Cardinal Engineering Corp., Philadelphia 37, Pa. —Diamond blade for wet cutting with any standard masonry saw is designed for cutting brick, tile, concrete, refractory or other hard masonry materials. Blade is hardened, tempered and tensioned at factory to



proper operation speed. Segments are guaranteed not to come off in normal use. Diamond blade is available in a variety of special specifications as well as in a general purpose type.

For More Details Circle No. 19—Page 223

Elevating End-Gate: Gar Wood Industries Inc., Wayne, Mich.— Elevating end-gate is designed for installation on rear of 1½-ton or larger trucks, or semitrailers, and lifts or lowers loads up to 2000 lb. Opening, lowering, raising and closing operations are hydraulically actuated by single lever controls, one located on each side, which operate one valve that controls all movements. A single,



SPO does it again!

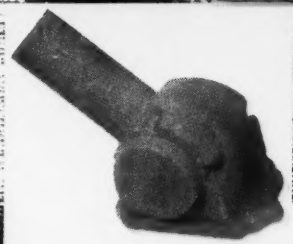
the world's first HOLLOW CORE machine

Here's another first by SPO to open new horizons in precision molding... a machine designed to produce uniform standard *hollow cores.* These hollow cores assure closer tolerances... eliminate venting problems... permit faster and easier core shake-out. They also require less curing time... can be made faster.

The new SPO Model 10 Hollow Core Machine makes finished cores in a 45-second cycle without the use of separate dryers or core ovens. All operations except positioning of coreboxes and core removal are automatic. In addition, absolute accuracy of finished cores is assured because they are not removed from box or handled until cured and ready to use.

A two-station machine requiring only one operator, Model 10 can be installed in molding machine lines to speed up production. This versatile machine combines simplicity of operation with famous SPO accuracy and dependability to give new precision and economy in core production and finished castings.

Write today for complete details.



• ASSURES CLOSER TOLERANCES

• ELIMINATES VENTING PROBLEMS

• PERMITS EASIER SHAKE-OUT

WORLD'S LARGEST SUPPLIERS SPO OF MOLDING MACHINES

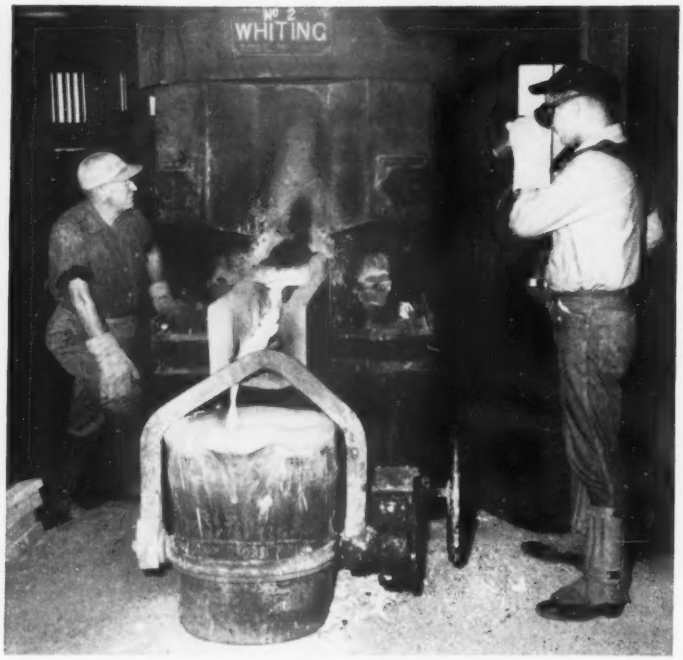
SPO INCORPORATED

6449 Grand Division Avenue

Cleveland 25, Ohio

6084-S1

ABC's Test Cupola Helps Maintain Uniformity of **ABC FOUNDRY COKE**



Test cupola is lined to 27" inside diameter and equipped with modern blast controls.

ABC is the only merchant coke producer that operates a test cupola for checking coke performance and carbon absorption as a part of its research and laboratory testing program.

ABC's test cupola has been operated regularly since 1944 by personnel from the Company's Research Department in coordination with its service engineers. In combination with usual chemical and physical tests, the test cupola has proved its value in forecasting coke performance, improving quality and maintaining that uniform quality for which ABC foundry coke is so widely recognized.

Your inquiries are invited.

ALABAMA BY-PRODUCTS CORPORATION

General Sales Office: First National Building, Birmingham, Ala.

Sales Agents:

GREAT LAKES FOUNDRY SAND COMPANY, Detroit; ST. LOUIS COKE & FOUNDRY SUPPLY COMPANY, St. Louis; THE RANSON AND ORR COMPANY, Cincinnati; KERCHNER, MARSHALL AND COMPANY, Pittsburgh; BALFOUR, GUTHRIE & COMPANY, LTD., San Francisco; ATWILL COKE AND COAL COMPANY, Chicago

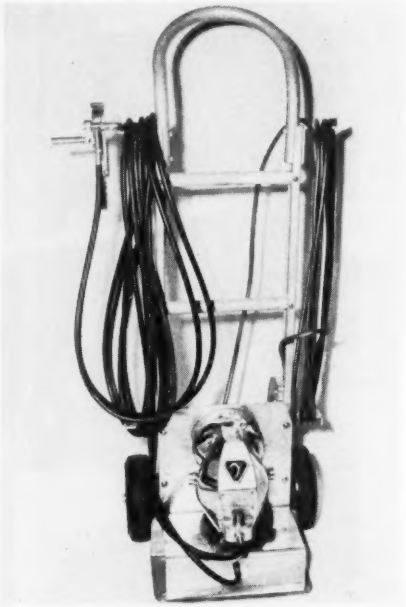
double-acting cylinder powers all operations. Safety latches and overload valves are incorporated in the design. Two platform styles, either standard or ramp type, are available, with loading areas of 28 x 84, 34 x 84, 28 x 90 and 34 x 90 in.

For More Details Circle No. 20—Page 223

Lubricant: Gebauer Chemical Co., 9410 St. Catherine St., Cleveland, O. —Nonflammable lubricant of colloidal graphite, fluorinated hydrocarbons and methyl ethylene has a low surface tension and high penetration and can be applied instantly, according to its manufacturer, to clear any gummed, clogged, or frozen part in any mechanism.

For More Details Circle No. 21—Page 223

Iridium Isotron: Gamma Corp., Mansfield, Mass.—Iridium isotron for remote handling of iridium 192 in industrial radiography allows sources up to 75 curies to be exposed at distances up to 50 ft from the operator, who can expose the source while remaining behind a concrete wall or a personnel shield. Machine is portable, requires no power and weighs 125 lb. Exposure times comparable to those for x-ray equipment are obtainable.



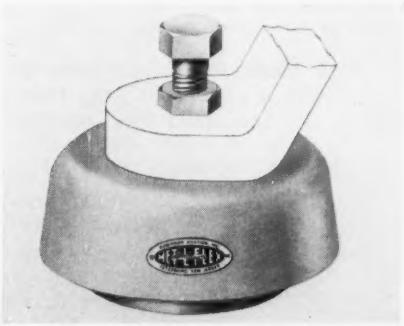
For More Details Circle No. 22—Page 223

Aluminized Suits: Far-Ex Corp., 75 West St., New York 6, N. Y. —Lightweight aluminized suits are made of flame-resistant fabric fused to metallic layers topped with treated aluminum foil. Available in ten models, the suits allow complete freedom of movement and weigh 5 to 10 lb. Recorded body temperatures remain normal even in radiant heat of 2500° F or more, according to manufacturer. Hoods allow 180 degree visibility and can be used with

breathing equipment. Hoods, leggings, aprons, boots and coats may be obtained separately.

For More Details Circle No. 23—Page 223

Machine Mount: Robinson Aviation Inc., Industrial Division, Teterboro, N. J.—All-metal mount



engineered to meet exacting standards of shock and vibration control features a built-in leveling device making it possible to install, level and align machinery without use of special tools. Machines need not be bolted or lagged to the floor, according to the manufacturer. Exposure to oil, water, solvents, dust, or extreme temperature reportedly will not affect its performance.

For More Details Circle No. 24—Page 223

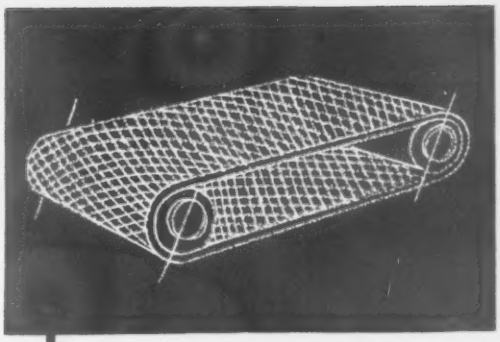
Dump Box: Palmer - Shile Co., 16033 Fullerton, Detroit 27, Mich.—Automatic dump box for handling all types of materials and parts can be used with hand, power lift or fork truck or can be picked up and moved by overhead hoist. Gravity latch locks box in upright position until ready for dumping. Of heavy gage steel,

all-welded construction, the boxes are 24 in. deep inside by 36 in. wide by 48 in. long, or built to specifications.

For More Details Circle No. 25—Page 223

Millivoltmeter: Bristol Co., Waterbury 20, Conn.—Indicating millivoltmeter has a high-torque jeweled millivoltmeter mechanism with a V magnet and a self-supporting coil. It is equipped with a neutralizing re-

HOLCROFT and the CONVEYOR FURNACE



STEP UP OUTPUT | KNOCK DOWN COSTS

The key word in heat treating today is automation—the handling of stock smoothly, efficiently, without waste. Obvious benefits are boosted production and slashed costs.

Holcroft's answer to automation may be conveyorized furnaces—automatic, not only in stock handling, but with automatically-controlled cycles, too. Each Holcroft installation is custom-engineered to do your job *at the lowest possible cost.*

Conveyor furnaces are almost unlimited in style and application. Single or multi-strand conveyors can be equipped with mesh belts, sheet belts, interlocking links, monorails or pusher chains. Direction of flow can be horizontal, vertical, or in combination—whichever affords the most economic use of available space. Some conveyors are completely inside the furnace—others are integrated into the production line.

Many other types of stock-handling furnaces are available. They're all described in Holcroft's book "Blazing the Heat Treat Trail". Better write for a copy today. Holcroft & Company, 6545 Epworth Blvd., Detroit 10, Michigan.

BUILT BY HOLCROFT & COMPANY DETROIT-MICH — PRODUCTION HEAT TREAT FURNACES FOR EVERY PURPOSE

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CANADA: Walker Metal Products, Ltd., Windsor, Ontario EUROPE: S.O.F.I.M. Paris 8, France

CESCO ***RIGHT... before your Eyes!***

CESCO No. 10256

NOW... an Air-Conditioned Grinding Hood

Now complete protection can be provided to every worker who must do grinding in an area where exhausting of abrasive-laden air is impractical. The CESCO No. 10256 Grinding Hood with its supplied air unit was designed for this service and has proved invaluable in use by hundreds of workers.

The CESCO Grinding Hood slips on quick, and gives complete breathing protection. The air supply is regulated by the wearer to suit his breathing.

The large full-view window is made of acetate and easily replaced when necessary. There is plenty of room inside the hood so the user can wear safety glasses or goggles. Comfortable fitting headgear prevents slipping. The hood is made of durable, washable, double-filled khaki duck. Helmet-headgear combination is fastened to hood by a slide fastener for quick removal and attachment.

•

See your CESCO safety equipment distributor for further information on the CESCO No. 10256 Grinding Hood, or write for details today

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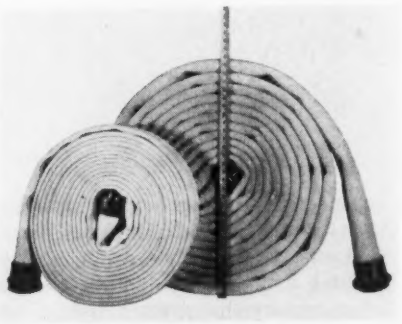
CESCO FOR SAFETY

OFFICES IN: Atlanta, Birmingham, Boston, Buffalo, Cincinnati, Cleveland, Columbus, Dallas, Detroit, East Orange, Houston, Indianapolis, Kansas City, Knoxville, Little Rock, Los Angeles, Louisville, Mexico City D.F., Milwaukee, Montreal, Peoria, Philadelphia, Pittsburgh, Salt Lake City, San Francisco, Spokane, St. Louis, St. Paul, Toledo, Tulsa, Wichita

sistance to compensate for changes in coil resistance due to ambient temperature changes. Accuracy is claimed to be 1 per cent full scale value. Minimum response time is less than six seconds for 99 per cent response. Indicator can be used as a pyrometer, tachometer or pH indicator, or for power consumption measurements.

For More Details Circle No. 26—Page 223

Fire Hose: Hamilton Rubber Mfg. Corp., Mead and Lever Sts., Trenton 3, N. J.—Industrial fire hose con-



tains chemically produced polyester fiber cords in both inner and outer jackets to provide strength, lightness and flexibility with minimum bulk. Hose is supplied in 1½-in. ID and 2½-in. ID double jacket construction with 400 lb test pressure. Construction features permit tight folding when not in use.

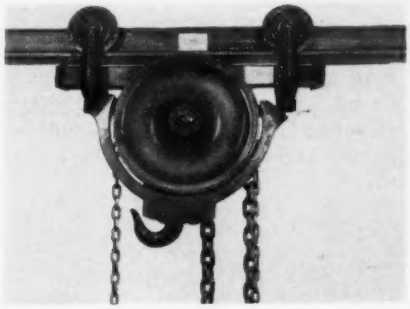
For More Details Circle No. 27—Page 223

Gunning Rig: Air Placement Equipment Co., 1011 West 24th St., Kansas City, Mo.—Portable rig for

air placement of concrete and other cementitious materials can be used for concrete and masonry restoration, water proofing, fire proofing, wet and dry sandblasting, refractory lining and the application of insulating refractories. The rig consists of a gunning unit and a combination proportioning, mixing and elevating machine. Premixed aggregate elevated to an upper hopper is metered continuously under pressure to the material hose and through a nozzle equipped with separate air and water

lines. At the nozzle the aggregate is hydrated by an atomized spray. Upon application, the mixture rises to the surface instantly. Gunning equipment is available in various sizes to meet all capacity requirements.
For More Details Circle No. 28—Page 223

Trolley: Forker Corp., 2012 Random Rd., Cleveland 6, O.—Tramrail trolley developed for low headroom areas is available for use with chain blocks, electric hoists or special applications. Clearance between trolley load bar and track is ½-in. Crosshead pin arrangement enables the load bar to support the hoist unit directly. Design is available for 1, 2 and 3-ton trolleys of four and eight-wheel construction. Draw bar pull on straight level track is 15 lb per ton to start load rolling and 10



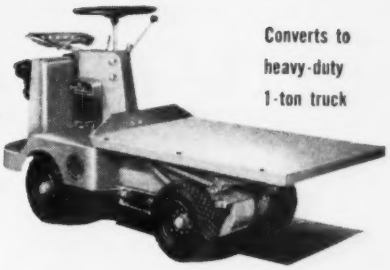
lb per ton to keep the load rolling at constant speed, the manufacturer states.
For More Details Circle No. 29—Page 223

Abrasive Cones: Cratex Mfg. Co., 81 Natoma St., San Francisco 5, Calif. — Rubberized abrasive cones contain a threaded steel bushing which, once in position, reportedly cannot be pulled loose, twisted or

turned. Two sizes are available—1¾-in. long by $\frac{13}{16}$-in. diam and 1¼-in. long by ⅞-in. diam. Both are designed to fit ¼-in.-diam mandrel and

NOW! 4-WHEEL MOTO-BUG WITH 15 CU. FT. CAPACITY

- Has 2,000-pound load capacity.
- 15 cu. ft. gravity-dump hopper with snub-line control.
- Interchangeable 34" x 54" platform with side-board stake pockets.
- 8.3 h.p. gas engine (electric starter, muffler optional).
- 6 m.p.h. speed forward and reverse; automotive type brakes.
- Adjustable seat, easy-reach clutch lever, brake pedal.
- Automotive steering with 24-to-1 gear reduction ratio.
- Turning radius only 73 inches; overall width 35 inches.
- All-welded chassis; coil-spring-mounted steering axle.
- Dual pneumatic drive tires (or soft-core solid rubber) optional.



Converts to heavy-duty 1-ton truck

Has interchangeable 7-foot, 1500-pound fork lift

There's a smaller, 6 h.p. Moto-Bug available with hopper, platform and fork lift attachments. See your Kwik-Mix distributor, or write for details.

Want more facts?

mail to: KWIK-MIX COMPANY 3029 W. Concordia, Milwaukee 16, Wis. (Koehring Subsidiary)

Send us details on new Moto-Bug with: ☐ 15 cu. ft. hopper ☐ 2000-lb. platform

NAME ..... TITLE .....

COMPANY .....

STREET .....

CITY ..... STATE .....

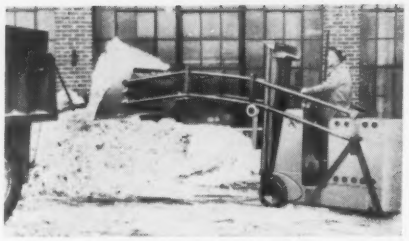
☐ Also send literature on 10 cu. ft. Moto-Bug.®

KM448REV. FO

both are made in four grits—coarse, medium, fine and extra fine. Applications include use on molds, dies and castings, blending of welded seams and removing heat marks, corrosion, tool marks, fatigue lines and scratches. The cones shape to contour in operation or can be dressed to shape using conventional dressing tools.

For More Details Circle No. 30—Page 223

Snow Scoop: Lewis - Shepard Products Inc., Watertown, Mass.—Scoop attachment for snow removal fits company's electric fork trucks. Unit is detachable and no hydraulic



valves or hose lines are necessary for operation. Scoop is connected to the truck frame by a parallel linkage which keeps bottom of scoop parallel to ground at all times except when dumping. Bottom set of parallel links rides on rollers mounted on the normal fork carriage. Raising and lowering the carriage also raises and lowers the scoop. Scoop capacity is 12½ cu ft.

For More Details Circle No. 31—Page 223

Emergency Light: Hobby & Brown Electronic Corp., Sentry-Lite Division, 55 Front St., Rockville Centre, N. Y.—Emergency light unit weighing 50 lb, including battery, is said to provide more than 12 hr of continuous operation. Two 5000-cp sealed beam lamps are used. More lamps may be added and choice of flood or spot lights is available. Automatic recharger operating on standard electrical power keeps battery up to peak capacity.

For More Details Circle No. 32—Page 223

Ram-Hammer: E. V. Nielsen Inc., 128 Broad St., Stamford, Conn.—Self-contained, portable hammer, operating on the ram principle, requires no air lines or electrical connections. Hammer is operated by hand and any of three weights may be mounted on the guide rod at the rear of the chuck holder. Weight is held in one hand, the chuck in the other. Impact is produced by sliding the weight down the guide rod against the rear of the chuck holder. An adjustable, sliding collet on the guide rod, as well as interchange of different size weights, are used to control the impact of the stroke from a light tap to a smashing blow. Chuck can accommodate over 40 tools for chipping, cutting, drilling, gouging, scaling, roughing or other operations.

For More Details Circle No. 33—Page 223

Finishing Compound: Minnesota Mining & Mfg. Co., Dept. A-1620, 900 Fauquier St., St. Paul 6, Minn. —Barrel finishing compound is designed to produce smooth finishes on zinc, aluminum and other light metal

Do You Use Old Fashioned Core & Mold Washes?

Mabco Hi-Resist, a finished *ZIRCON* wash, is mixed simply with water. After oven or torch drying, Mold is ready for use.

MABCO *HI-RESIST* is Cheaper, Faster, More Efficient, and CLEANER!

Check the following features --

- √ **High Refractory Value — above 3700° F.**
- √ **Plastic Form — Stays in suspension.**
- √ **Water Insoluble and Waterproof after dry.**
- √ **Controlled Penetration — Closes pores to a depth of 5 to 7 sand grains.**
- √ **Totally Inert to any metal or alloy far above pouring temperatures.**
- √ **Excellent Ladle Wash — Is not wetted by molten metal.**

Save time and Money with these other fine Mabco Core and Mold Washes.

MABCO AP (all purpose)

Low cost ingredients and high value efficiency — Mabco AP undergoes a RADICAL color change upon drying. High permeability for quick drying mold surfaces.
High refractory value (3150°) Miscible with either water or alcohol. Alcohol gives faster drying, greater penetration.

MABCO Heavy Plastic

A base material for steel and gray iron core washes, refractory material is added by user to meet specific requirements. (Mixing instructions with orders). Gives smooth surface when dry and is highly resistant to moisture. Cores may be stored for considerable length of time without noticeable deterioration.

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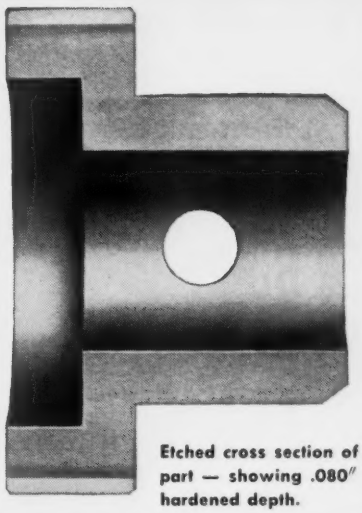
"Serving the foundry industry for over 25 years"
HOUSTON DENVER

COSTS CUT 94%



Etched cross section of part — showing .080″ hardened depth.

with TOCCO* Induction Heating

A cost reduction of 94% resulted when heat-treatment of this Corn Harvester part was changed from carburizing to TOCCO-hardening. Look at the unit cost breakdown:

CARBURIZING		TOCCO-Hardening	
Degrease	$0.0020	*eliminated*	
Carburize	0.0200	*eliminated*	
1st quench	0.0150	TOCCO, heat and quench	$0.0060
2nd quench	0.0150	*eliminated*	
Draw	0.0050	*eliminated (self-draw)*	
Shotblast	0.0035	*eliminated*	
Internal Grind	0.0243	*eliminated*	
External Grind	0.0166	*eliminated*	
	$0.1014		$0.0060

"—Savings of 9½ cents per piece—$4770.00 on each 50,000 piece batch, *plus* an hourly production increase from 120 to 300 pieces per hour, *plus* improved quality of the product by virtue of the deeper case and stronger core."

Have you investigated TOCCO's cost-savings possibilities for your hardening, brazing, melting or forging operations? Why not write us today or send blueprints of your parts —no obligation, of course.

THE OHIO CRANKSHAFT COMPANY

TOCCO

*Trade Mark Reg. U. S. Pat. Off.

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Please send copy of "TOCCO Induction Heating."

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Company_____

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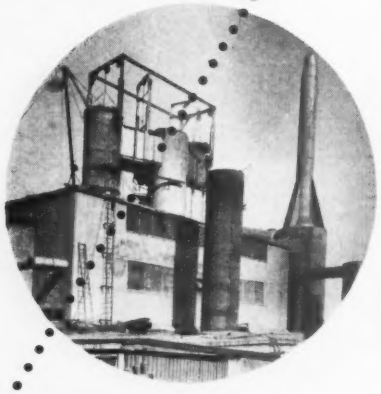
City_____ Zone____ State_____

GRINDLE Engineered



Means **BUILT to Endure**

Features

A HOT BLAST

- that reduces casting costs in proportion to the number of hours the Cupola is operated and tons melted per hour.
- The purchase and operation of GRINDLE equipment by such firms as Ford, General Motors and National Malleable & Steel Castings Company is evidence of GRINDLE acceptance by leading foundries.
- There is an effective GRINDLE "answer" to every foundry problem . . . whether it's a simple charging system or a complete melting unit.
- Send us details of your present operation. We will be happy to submit a preliminary recommendation with approximate price quotations. These basic facts can serve as a guide to your future progress.

GRINDLE *Corporation*

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HARVEY, ILLINOIS

alloy die castings. According to the manufacturer, the compound will remove light machine marks and leave a fine surface finish, with a minimum of stock removal, avoiding deep scratches and exposure of porosity in castings. Smoothness of surface produced by compound reportedly improves the quality of subsequent plating and ball burnishing operations.

For More Details Circle No. 34—Page 223

Photo Copy Developer: Heccokwik Division, Hunter Photo Copyist Inc., 586 Spencer St., Syracuse, N. Y.—Developer fluid for photo copy equipment contains a long-lasting chemical that retains full developing strength within the machine for a full work week. Manufacturer states that the developer will produce extremely high-contrast black and white prints of any printed, typed, written or drawn material on translucent or opaque paper of any weight.

For More Details Circle No. 35—Page 223

Recorder Ink: Foxboro Co., Foxboro, Mass.—General purpose ink for use with company's line of industrial recording instruments assertedly contains no sediment, is smooth flowing, will not clog the pen, and dries quickly without feathering the chart. Special properties are said to give it a wide range of performance under varying industrial conditions. Plastic capillary tube and filter assembly enables user to pinpoint a precise

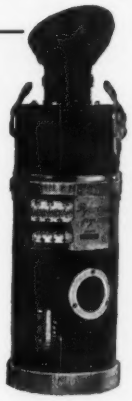
quantity of ink on the pen without dripping on chart or instrument. Ink is furnished in red, violet, blue, green and black.

For More Details Circle No. 36—Page 223

Bleed Valve: Gray Tool Co., P. O. Box 2291 (H51), Houston 6, Tex.—Stainless steel vent-drain-bleeder valve in sizes ½ and ¾-in. has been designed for 20,000 psi safe working pressure or temperatures up to 1200° F. Pressure-sided seat

PYRO
Instruments for precision temperature measurement

The Simplified
PYRO
Optical Pyrometer



The only completely self-contained and direct reading Optical Pyrometer for quick and accurate temperature measurements of molten iron, steel, monel, etc. No calibration charts or accessories required. Weighs only 3 lbs. PYRO will pay for itself many times over by helping prevent spoilage. Write for Catalog #85.

The Improved
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The ideal instrument for quick and accurate surface temperature measurements —particularly for shell molding, core oven, mold and die temperatures. Designed for ruggedness and accuracy it features automatic cold end compensator, large 4¾" direct reading dial and shock, moisture and dust-proofed shielded steel housing. Ask for Catalog #168.

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PYRO
Immersion Pyrometer

Helps insure low-cost production of SOUND and UNIFORM non-ferrous castings. Withstands roughest handling. "Protected Type" and "Bare Metal" thermocouples instantly interchangeable. Equipped with exclusive LOCK SWIVEL. Stock ranges from 1000°F to 2500°F. Ask for Catalog #155.

THE PYROMETER INSTRUMENT COMPANY Inc.
Bergenfield 6, New Jersey, U. S. A.

makes it leakproof for oil, water, steam or gas service. Its stainless steel construction makes it suitable for any fluid or atmosphere according to the manufacturer.

For More Details Circle No. 37—Page 223

Headshields: Hobart Bros. Co., Hobart Square, Troy, O.—Fiber glass reinforced plastic headshields for head protection of welders are lightweight, durable, and heat and moisture re-

sistant. One model has lens holder molded into the shield to eliminate light leaks. Another model is of same general construction but has a lift front lens holder to permit operator to view, chip and clean welds without raising hood. Both shields are equipped with federal specification lens.

For More Details Circle No. 38—Page 223

Conveyor Components: Sandvik Steel Belt Conveyors, Division of Sandvik Steel Inc., 111 Eighth Ave., New York 11, N. Y.—Pre-engineered components for steel belt conveyors enables users to engineer a complete conveyor by selecting the components necessary to meet requirements. Typical components available are drive-end and tension-end assemblies, steel belts, discharge devices, safety devices and loading hoppers. All are ready for immediate installation on new or suitable existing structures.

For More Details Circle No. 39—Page 223

Grid Heater: Rempe Co., 340 North Sacramento Blvd., Chicago 12, Ill.—Grid heaters are for use in heating solutions in rinse, cleaning, caustic and plating tanks and all general fluid heating service. Cross-sectional width of heat transfer surface is 2¾-in. Units can be used on the side or bottom of tank with horizontal or vertical supply and return. Concentration of heating surface promotes agitation within solution being heated. Staggered arrangement of the tubes accelerates fluid motion

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● Herc-Alloy is a special all-purpose chain with long-wearing properties and high resistance to impact loading.

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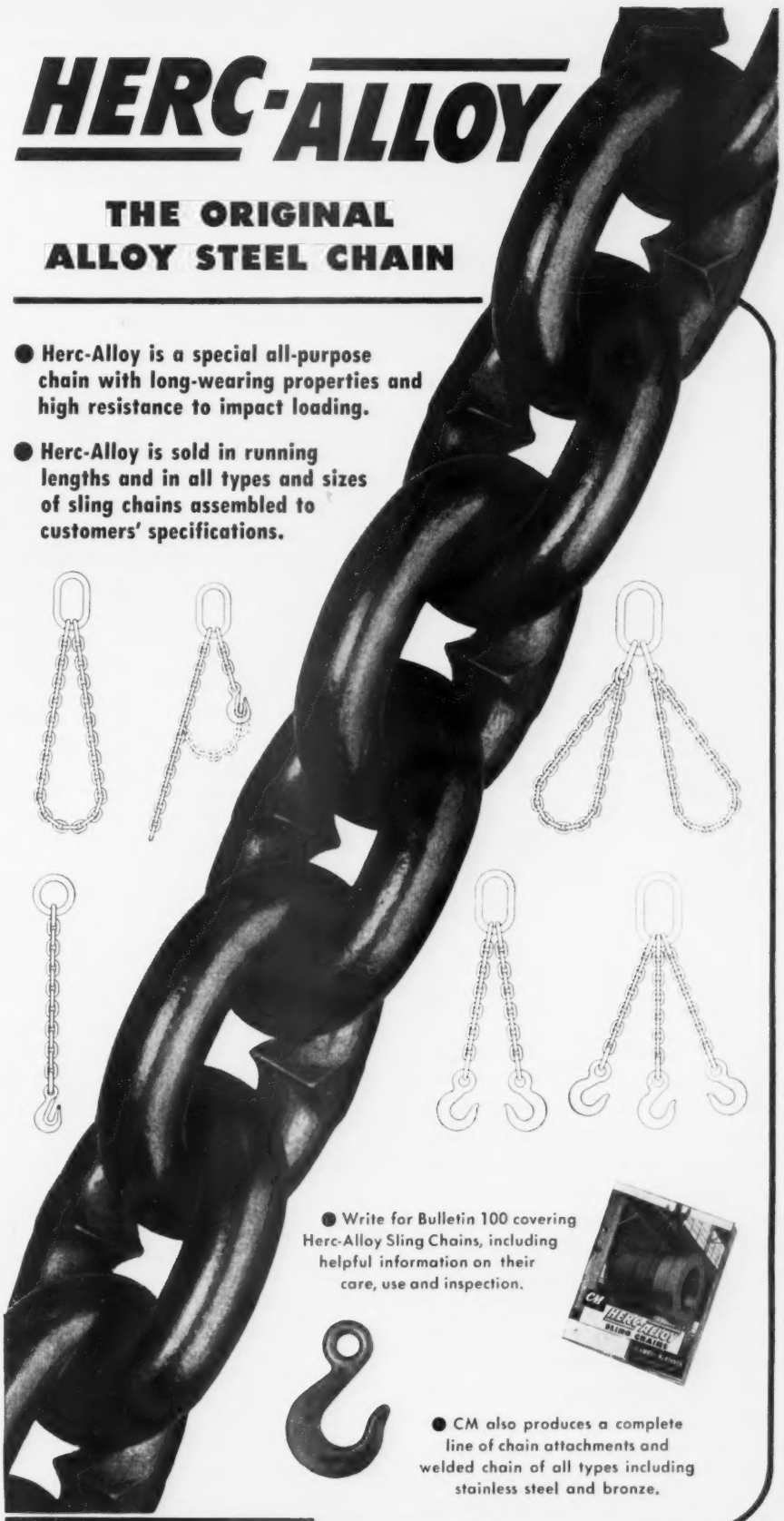

● Write for Bulletin 100 covering Herc-Alloy Sling Chains, including helpful information on their care, use and inspection.

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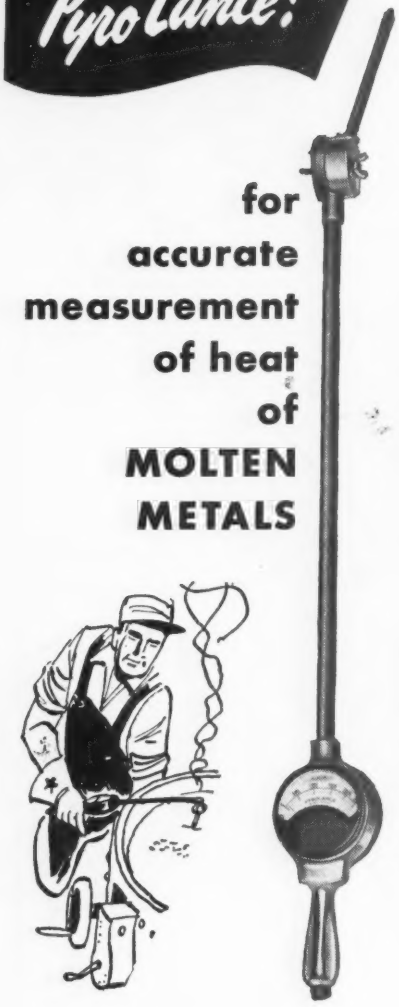

For quick, accurate temperature readings of molten metals, operators of non-ferrous foundries everywhere are relying on the Alnor Pyro Lance. Portable, handy to use, the Pyro Lance has a protected thermocouple, with adjustable angle head, mounted in the lance tip. It takes temperature below the surface—unaffected by dross or other conditions. Here's an easily handled instrument to help control quality in the foundry. For complete information and prices on this valuable instrument write for Bulletin No. 1724-D. Illinois Testing Laboratories, Inc., Room 511, 420 N. LaSalle St., Chicago 10, Illinois.

Alnor

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by its conduction and convection factor. Average heat transfer coefficient when heating water to boiling point is 800 Btu per degree temperature difference, per hour, per lineal foot of overall length. Grids can be made of any material for special applications.

For More Details Circle No. 40—Page 223

Safety Hat: Willson Products Inc., Reading, Pa.—One-piece reinforced plastic safety hat features the

"geodetic" or "great circle" crown suspension to distribute the force of a blow over a large area of the head. The suspension is made up of four straps, none of which crosses the top or crown of the head. Straps are attached to the shell by stainless steel clips. Hat is of smooth contour, free from ridges which might tend to catch the full impact of a falling object. Headband cushion contains 12 vinyl plastic air cells located between the sweatband and the hat shell. Headband resists and distributes the impact of lateral blows on the perimeter of the head. Hats are available in five colors—yellow, red, green, gray and white.

For More Details Circle No. 41—Page 223

Soapstone Holder: Atlas Welding Accessories Co., 707 East Lewiston, Ferndale 20, Mich.—Metal soapstone holder has a spring clip for carrying it in the pocket and a button slide so the soapstone can be expelled when it wears down. Holder protects the marking material from breaking and enables use of short ends. Can be used to mark work or to encircle casting defects.

For More Details Circle No. 42—Page 223

Flexible Coupling: Climax Metal Products Co., 863 East 140th St., Cleveland 10, O.—Flexible couplings equipped with split taper bushings for quick mounting can be used to connect shafts of different sizes. One piece split-taper bushing has a socket-head cross bolt across the compression slot. Bushing is locked on the shaft by the cross bolt and the coup-

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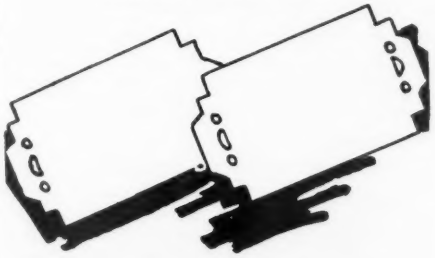

The SCIENTIFIC CAST PRODUCTS Corp.

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2520 West Lake Street
CHICAGO 12, ILLINOIS

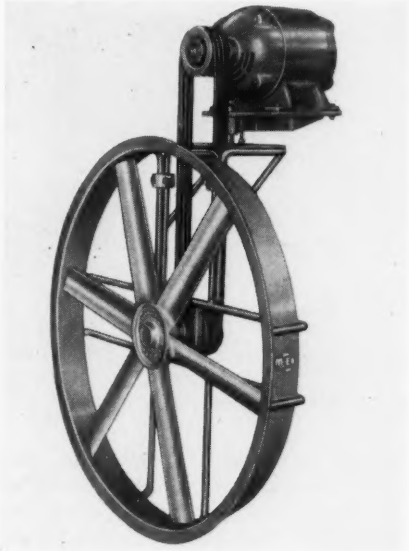
ling then drawn up by jack screws. When drawn up, the bushing hub is compressed by the matching taper of the coupling bore for a positive press fit on the shaft. All bushings are provided with standard keyways. Couplings are available with bushings in 1/16-in. shaft diameter increments over the entire bore range.

For More Details Circle No. 43—Page 223

Hand Stamp: Noble & Westbrook Mfg. Co., East Hartford, Conn. —Part numbers, heat code numbers and similar identifying data can be stamped by a small, compact hand stamp. Single locking pin maintains stamping alignment and supplements the main shaft in absorbing shock when stamping. Friction disks between wheels prevent rotation of adjacent wheels as a single number is indexed. Eleven division wheels are used with engraved characters 1 through 0 and one blank space. Special selection of letters can be obtained upon request. For the present $\frac{3}{32}$ and $\frac{1}{8}$-in. character sizes are available.

For More Details Circle No. 44—Page 223

Exhaust Fan: M & E Mfg. Co., 2571 Winthrop Ave., Indianapolis 5, Ind.—Belt-driven exhaust fan is made in range of sizes from 12 through 48 in. diam with capacities from 900 to 38,000 cfm, suitable for operation against static pressures up to 1½ in. Design features include nonsparking,



noncorrosive solid-cast aluminum blade, sealed ball bearings, adjustable motor mount support and heavy duty construction throughout.

For More Details circle No. 45—Page 223

Lubrication: Automatic Transportation Co., 149 West 87th St., Chicago 20, Ill.—Two systems of centralized lubrication are available on company's standard model electric industrial trucks. Self-greasing is used on one series of fork lift trucks

Crescent Chaplets

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While we have just about every size and type of chaplet you can think of, there is a *possibility* that we don't have the *exact type* you require. In that case, we can design and develop *just the chaplet* to suit your requirements! We have all sorts of working samples available, and are always ready to ship them in a hurry to those who wish to try them.

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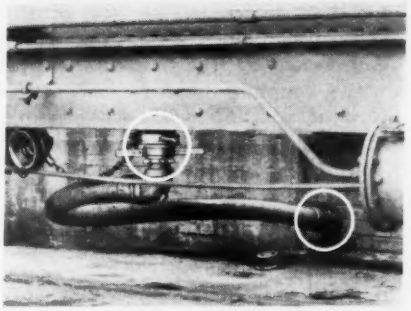
through a small reservoir and a mounted injector. By pushing the injector plunger twice daily the system is kept charged. Platform trucks have accessible fittings at two points on each side of the chassis to service all trail axle and steering connection fittings.

For More Details Circle No. 46—Page 223

White Ink: Time Saving Specialties, 2816 Dupont Avenue South, Minneapolis, Minn.—White ink for marking on dark, flexible or highly polished surfaces will neither flake nor rub off, is resistant to coolants and is removable when desired, according to its manufacturer. Ink is said to be fast drying, impervious to light, is not affected by oil, grease or moisture yet is removable by solvents furnished with each marking set containing the ink. A felt-nib fountain pen is used for writing or marking on an almost limitless range of surfaces.

For More Details Circle No. 47—Page 223

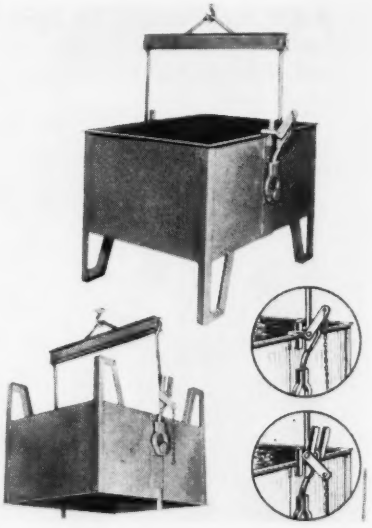
Hose Coupling: Titeflex Inc., 10 Hendee St., Springfield 4, Mass.—Flexible hose coupling from the discharge fitting on the underside of a



tank car to the inlet fitting of a storage receptacle reportedly saves labor and increases safety in tank car unloading. Full threaded coupling nipple screws onto discharge fitting on the tank car. Nipple has handles on it to eliminate use of a wrench. Coupling body, attached to the flexible discharge line by an elbow fitting, has handles attached to the collar so it can be easily retracted. When coupling ends are locked together the connection is leakproof.

For More Details Circle No. 48—Page 223

Tote Box Truck: Techtmann Industries, 407 East Michigan St., Milwaukee, Wis.—Tote box truck is for handling heavy materials in single or stacked boxes. Truck has a pivoted carrier platform which tilts to the floor to an inclined position for



loading. A hook engages the drop handle or hand hole of the box. When leverage truck handle is pulled forward, the load slides up the incline platform. Carrier platform automatically lowers to a horizontal position. Three 3½-in.-diam, 1¼-in. face, antifriction bearing wheels carry the load. Platform has a width of 13 in., length of 27 in., and a height of 5 in. Capacity is 800 lb.

For More Details Circle No. 49—Page 223

Backstand: Hammond Machinery Builders, 1605 Douglas Ave., Kalamazoo, Mich.— Abrasive belt backstand is for light polishing or debur-

Asbury

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CARBON-FREE EXOTHERMIC HEAD COMPOUND

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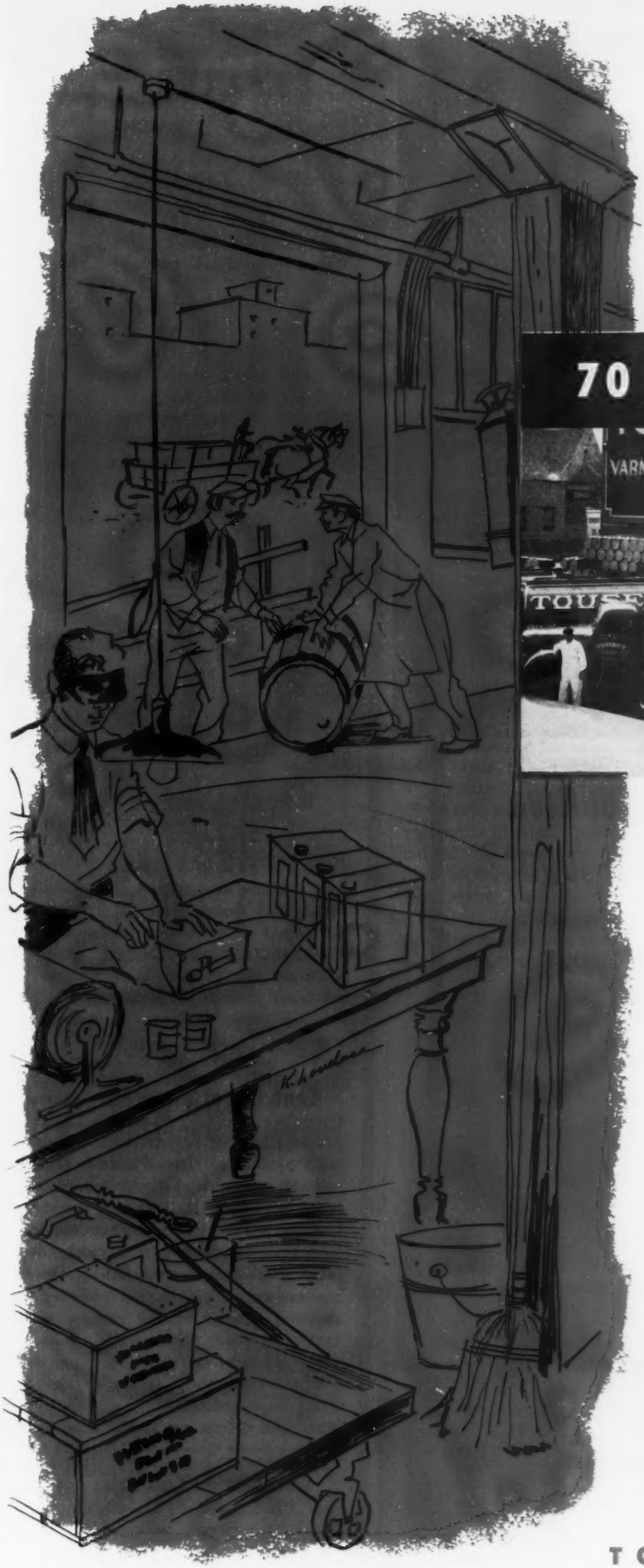

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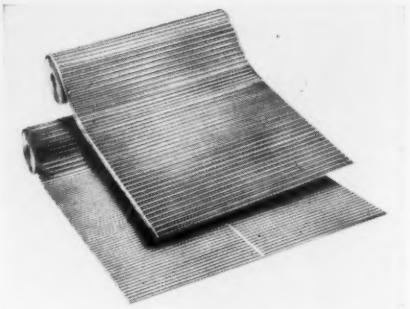
ring production operations. Belts up to 4 in. wide can be used. Bracket for floor or wall mounting aids installation. Extension controls for tracking and tensioning can be furnished so adjustments can be made at the operator's working position.

For More Details Circle No. 50—Page 223

Lifting Magnet: Ohio Electric Mfg. Co., 5400 Dunham Rd., Maple Heights, Cleveland, O.—High-capacity, 45-in. lifting magnet designed for use with mobile or overhead gantry cranes weighs 3400 lb and is hermetically sealed against moisture by having its outer ring and top plate welded together on top to eliminate cracking or damage by frequent blows against the outer ring.

For More Details Circle No. 51—Page 223

Rubber Mat: Wear Proof Mat Co., 2156 West Fulton, Chicago, Ill.—Two designs of rubber mats to increase safety and combat leg and



foot fatigue are grease and chemical proof and formulated of a specially developed live rubber, according to the manufacturer. Design featuring a cross rib runner is available in white or gray in 36 and 48 in. widths and up to 60 ft lengths. Other design is available only in 48 in. widths.

For More Details Circle No. 52—Page 223

Centrifugal Blowers: Hartzell Propeller Fan Co., Piqua, O.—Line of nonoverloading centrifugal blowers with backward curved blades feature welded steel frames and heavy gage steel housings. Ballbearing construction is standard on all models. Motors to meet any current characteristics and special operational requirements are available. All blowers are shipped assembled for clockwise rotation, bottom horizontal discharge. Counterclockwise rotation, when specified, is supplied at no extra cost. Fifty-eight blowers in a variety of sizes and drives are in the line.

For More Details Circle No. 53—Page 223

Automation Controls: Assembly Products Inc., Chesterland, O.—Line of controls is designed to detect minute changes of current or voltage while indicating their magnitude. Unit trips relays for control as a result of these changes. Some

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exclusive producers
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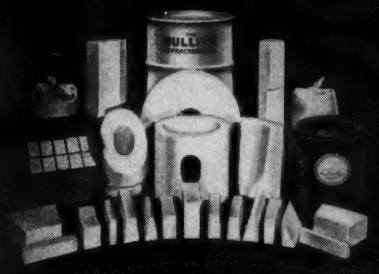

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applications include automatic pH alarm, photocell light detectors, battery chargers, gas alarm devices and moisture content control. Units contain no vacuum tubes. Contact is

made directly in a sensitive meter relay. Signal input may be microamperes or millivolts, alternating or direct current. Control sensitivity may range from 0.2 microamperes to 1000 amps or more, voltage sensitivities from 0.1 millivolts to over 500 v.

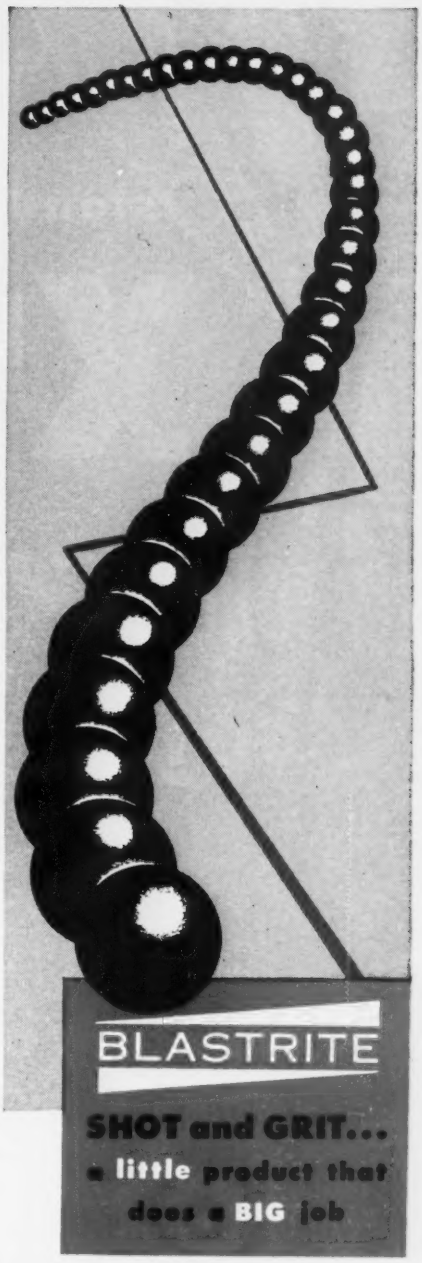
For More Details Circle No. 54—Page 223

Two-Way Heater: Radio Frequency Co., Medfield, Mass.—High-frequency research heating unit can be used for both induction and dielectric heating. Uses cover a full range of heat treating applications. Induction applications include pinpoint heating of metals isolated in insulation or in a vacuum, gluing, brazing, soldering, hardening, annealing and melting of metals. Dielectric applications include vulcanizing, heating, drying or sterilizing liquids and solids and gas ionization (as in spectrographic work). The 5-kw dielectric unit can be run con-

tinuously at a frequency of 85 megacycles. Induction unit has a 10-kw output tube. Both outputs are variable from 0 to 5 kw.

For More Details Circle No. 55—Page 223

Bin Level Control: Stephens-Adamson Mfg. Co., Aurora, Ill.—Company's bin level control has been redesigned. Switch housing and de-



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New low friction, extra quiet, high efficiency bearing for conveyor rolls. Semi-precision construction, yet no increase in price.

Sectional view of the new Logan X-Bearing now furnished on 90% of Logan Rollers. Belt and Live Roller Conveyors equipped with X-Bearings require less horsepower.

Logan announces: All bearings No. 50 size (7/16" shaft) and larger are now X-Series type.

And here is good news: X-Bearings are available at the same price as old style bearings. This is possible because mass production has greatly reduced costs of manufacture. Also since X-Bearings are interchangeable with old style bearings they will be furnished on replacement orders.

X-Bearing, Logan's new low-friction bearing is patterned after designs formerly found only in expensive precision bearings. Less grade is required on gravity lines and the manual effort required has been correspondingly reduced on level push lines. Write for Folder X-1.

LOGAN CO., 580 CABEL ST., LOUISVILLE, KY.

Write for your copy of Folder X-1

Logan Conveyors

flector mechanism have been changed to reduce possibility of sticky material building up on the unit. Pendant steel cone deflector has been replaced by a steel pyramid. Switch is one-piece unit of spun steel tapped at one end for electrical conduit and sealed at other end by a molded rubber grommet. Other design features are unchanged.

For More Details Circle No. 56—Page 223

Boom Lift: Root Spring Scraper Co., 517 West North St., Kalamazoo, Mich.—Truck front end hydraulic boom type lift of cantilever construction can lift 1500 lb. It can be mounted on any truck from 1½ tons up. Lifted load can be swung in a 40-degree arc by hydraulic power. All operations are controlled from cab, and operator has full view of work at all times. Hydraulic power unit and controls are available for trucks not already equipped.

For More Details Circle No. 57—Page 223

Industrial Fans: Westinghouse Electric Corp., Sturtevant Division, Dept. 022, 200 Readville St., Hyde Park, Boston 36, Mass.—Redesigned series of fans features a wide range of sizes with wheel diameters from 8¼ to 34½-in. and inlet pipe sizes from 4½ to 18 in. Air volumes range from 150 to 12,000 cfm. Fan housings are convertible to all normal discharge directions and also are reversible. Bearings are triple sealed against penetration by powdered material handled by fans. Of rugged cast iron construction, the manufacturer states the fans will handle wood shavings, chips, granular material, textile fibers, asbestos, rags, powders, dust, gases and fumes.

For More Details Circle No. 58—Page 223

Resinoid Wheels: Bay State Abrasive Products Co., Westboro, Mass.—Resinoid bonded disc-wheels contain a multi-layer reinforcement of fibre glass plus nylon mesh to provide added strength for heavy

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duty grinding. A range of grades is available to allow a choice of hardnesses to meet requirements of different grinding jobs.

For More Details Circle No. 59—Page 223

Fire Extinguisher: Ansul Chemical Co., Marinette, Wis.—Fire extinguisher is said to operate at —65° F. Special rubber hose withstands extreme cold without stiffening or cracking, according to the manufacturer. Nitrogen is used to expel the extinguishing agent. Hand portable units of 4 and 20-lb capacity and wheeled units of 150 and 350-lb capacity are available. The low temperature extinguishers are painted blue to distinguish them from regular red units.

For More Details Circle No. 60—Page 223

Fans: Bayley Blower Co., 1817 South 66th St., Milwaukee 14, Wis.—Line of industrial fans in a range of 14 sizes and choice of wheel types are claimed to be adaptable to virtually any type of fume, materials handling or high temperature application. Fans are designed to provide maximum serviceability under the corrosive and abrasive conditions found in industrial exhaust service.

For More Details Circle No. 61—Page 223

Potentiometer: Technique Associates Inc., 211 East South St., Indianapolis 26, Ind.—Self-contained, mercury battery powered, direct reading, portable potentiometer is designed for checking and calibrating all types of industrial temperature instruments. Every instrument is calibrated for five ranges, which makes it possible for all types of thermocouples to be employed. A

millivolt range is included and special scales can be supplied for use with suitable transducers. Claimed accuracy is 1/6 of 1 per cent of scale spans. Resolution exceeds 2500 increments. Overall dimensions are 8½ x 9 x 12¼-in. Weight is 12 lb.

For More Details Circle No. 62—Page 223

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for over half a century the highest quality foundry coke
MILWAUKEE COKE SOLVAY
Milwaukee Solvay quality begins with the careful selection of the coal which is purchased for one purpose only—to make best coke.
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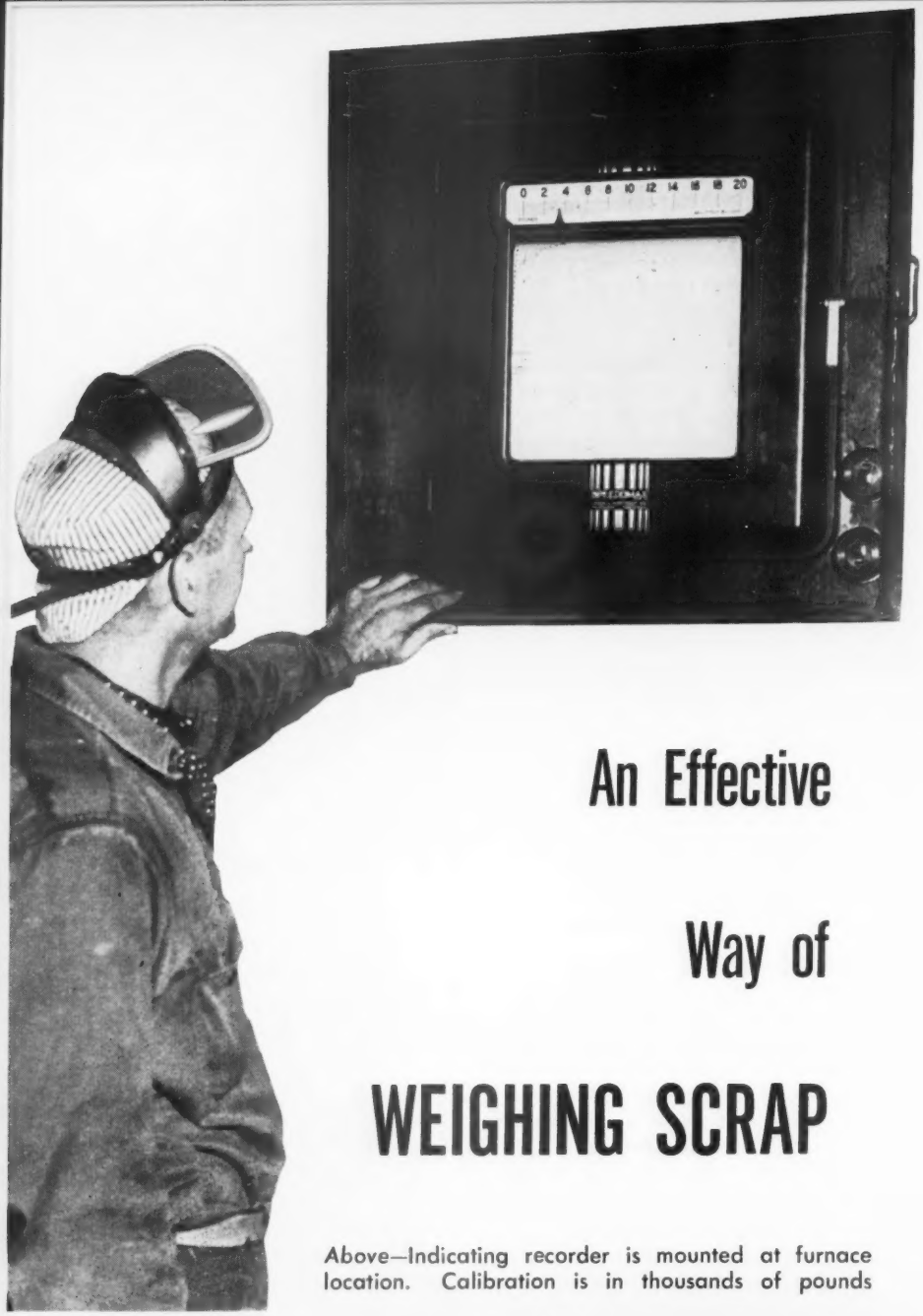


An Effective Way of WEIGHING SCRAP

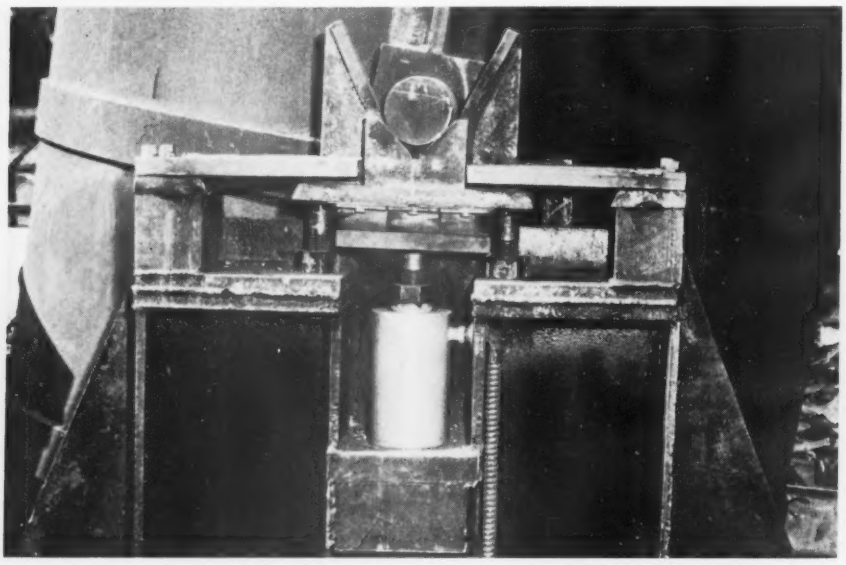
Above—Indicating recorder is mounted at furnace location. Calibration is in thousands of pounds

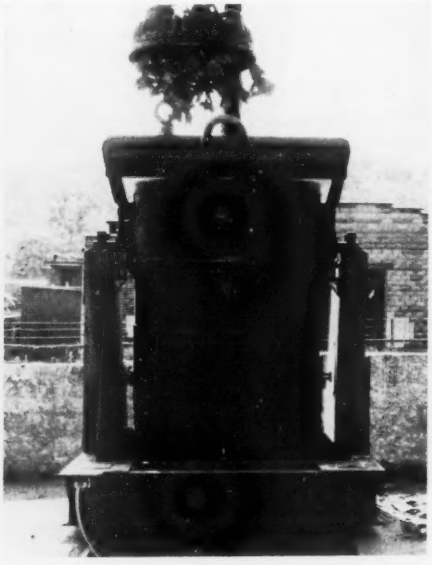
By ROBERT S. DAY
Field Engineer
Leeds & Northrup Co.
Philadelphia

ACCURATE scrap weighing is important in the production of steel castings at Duncan Foundry & Machine Works, Alton, Ill., but weighing equipment operates under rugged conditions. Scrap metal is loaded into the charging buckets by a yard crane which picks up 500 to 600 lb and drops it into the bucket from a minimum height of 6 ft. In addition, weighing stations may be located in spots exposed to inclement weather and rough conditions.

In spite of these disadvantages, a Leeds & Northrup indicating recorder for use with two 20,000-lb Baldwin load cells is weighing loads of 12,000 to 14,000 lb with 98 per cent accuracy. Over-all range is 20,000 lb, the smallest calibration is 200 lb, and a 100-lb reading can be estimated with fair accuracy.

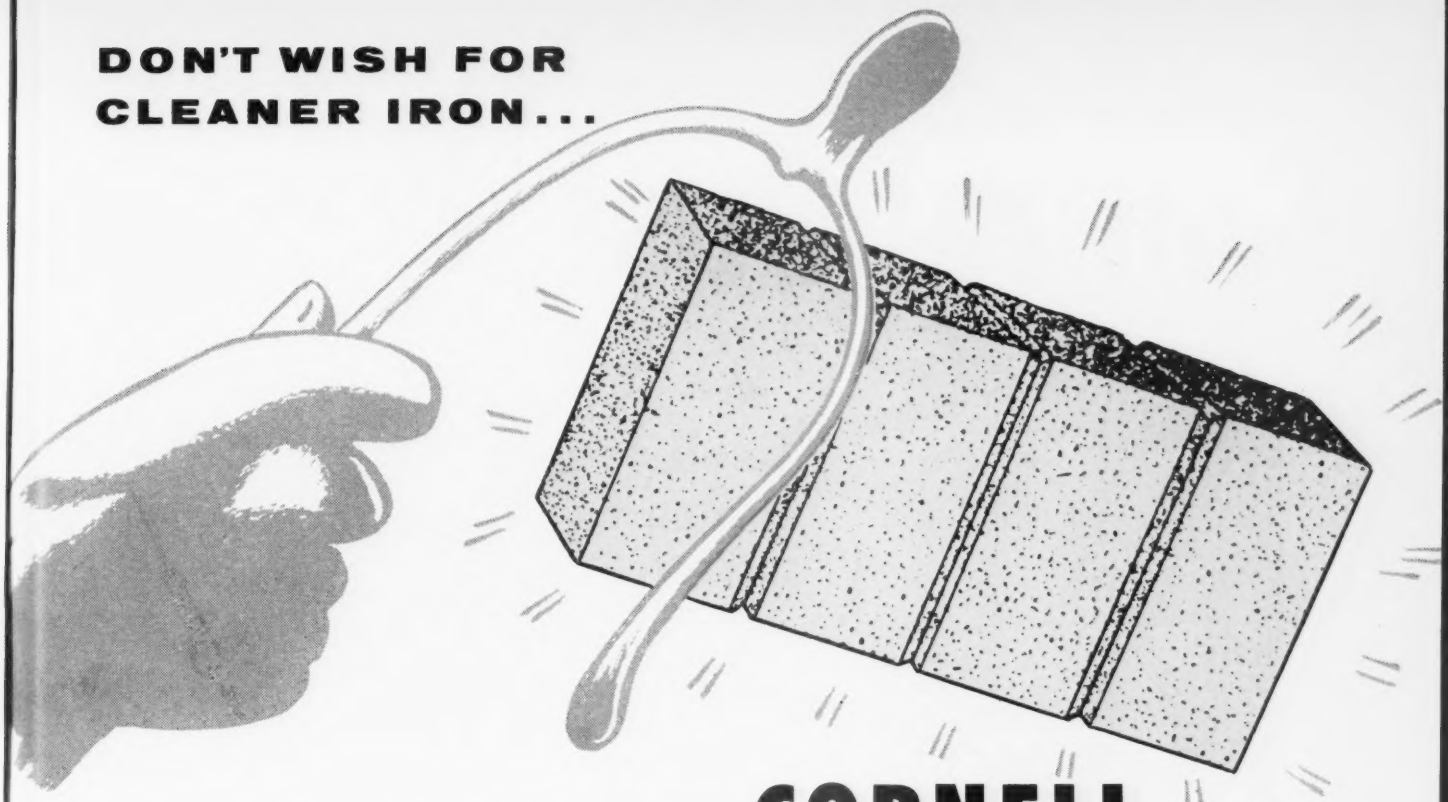
The equipment not only indicates weight, but also provides a record of the weight of each batch on a strip chart; and a transmitting circuit with a GE remote type indicator enables the crane operator to see at a glance the exact net weight in the charging bucket at any time. The system is entirely electrical, and with more electrical circuits any number of remote weighing stations and remote indicators can be installed. In addition, alarm circuits or signal lights can be hooked up as additional aids. No pits or weather proofing are necessary in the installation. Adjustments to compensate for the weight of the charging bucket can be made easily.





Left—Closeup of load installation shows load cell, electrical conduit, bearing plate, compression button of load cell, shock mounts and mechanical stops. *Right*—Yard crane loads scrap into charging buckets

DON'T WISH FOR CLEANER IRON...



GET IT WITH FAMOUS CORNELL FLUX

Here's first aid for foundries who are looking for cleaner iron free from impurities and foreign matter! Use Famous Cornell Flux with *every* heat of iron. Famous Cornell Flux purifies metal by chemically reacting with the molten mass to increase fluidity of iron and slag. You get *greater slag float* and *flow off*, less digging out and down time. Castings are free from hollow centers and hard spots. Machining is easier and smoother!

FAMOUS CORNELL FLUX PROTECTS LININGS

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CALL YOUR CORNELL FLUX ENGINEER

Without obligation, we will send a Cornell Flux engineer to talk over your iron-making problems with you. Cornell Flux engineers have years of practical experience with cupolas and have a first-hand knowledge of the problems you face. Call your area Cornell Flux engineer today or write for Bulletin 46-B for full information on Famous Cornell Flux.

WHAT FAMOUS CORNELL ALUMINUM FLUX CAN DO FOR YOU!

Famous Cornell Aluminum Flux cleans molten aluminum for tough, clean castings even when the dirtiest scrap is used. Forms a perfect covering over the metal during the melting process preventing oxidation and the gases that form during the melting.

Write for Bulletin No. 46-A

WHAT FAMOUS CORNELL BRASS FLUX CAN DO FOR YOU!

Famous Cornell Brass Flux makes metal pure and clean. It plays an important role in the production of high grade, bright finish aluminum or brass castings. Use more scrap without danger of dirt, porous or spongy spots. Thinner, yet stronger sections can be poured and the Cornell exclusive formula prevents obnoxious gases to a great extent.

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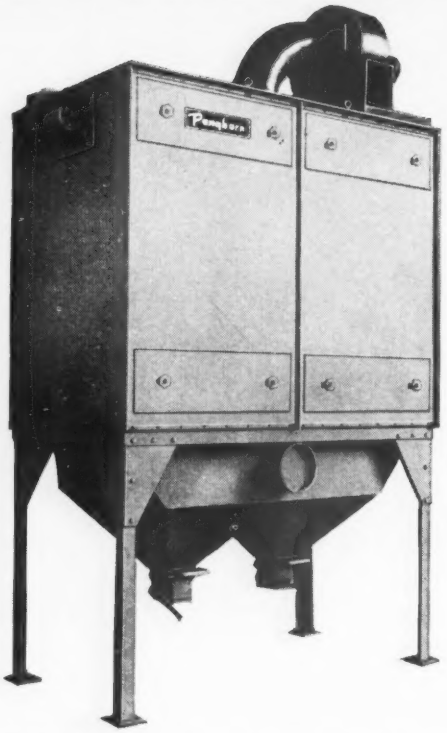

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Meditations of a Sandman

By HAROLD S. HENDERSON
H. C. Macaulay Foundry Co.
Berkeley, Calif.

"In Retrospect"

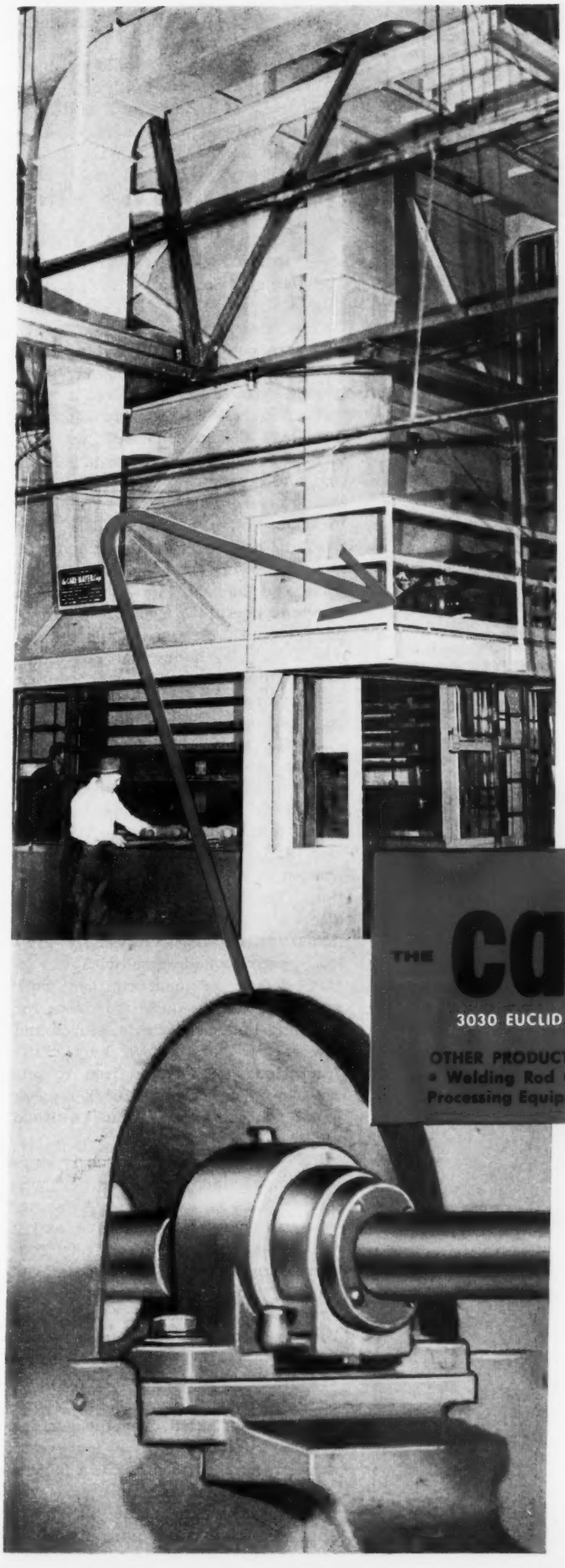
THE past is beautiful because it is free from fear." Such was the studied opinion of Thomas Carlyle, noted Scottish essayist. While probably millions of people in the world will agree with Mr. Carlyle's statement, as many will disagree most vehemently, and your old sandman is among this group, for he has a long memory.

It is a human tendency to remember what we want to remember and conveniently to forget or to disregard the rest. Occasionally we hear old foundrymen speak affectionately of "the good old days", when molders were considered dignified mechanics who produced artistic castings at a leisurely pace; when the graduate apprentice had to be able to produce, in one piece, a cup, saucer and spoon, entirely in green sand.

Now, we are told he pushes buttons and moves levers; and this constitutes his total knowledge of the molding trade. This again, is an odious comparison, and largely untrue. Very few of yesterday's apprentices ever produced an acceptable cup-saucer-spoon casting, and their productive capacity would in no way compare with that of today's boy on a machine.

The latter works fewer hours, is higher paid and produces more and better castings, thus contributing to a higher standard of living for all. He enjoys a greater sense of dignity both in the shop and in the community, and he lives on the higher plane of accomplishment of this machine age.

The so-called "good old days" are gone, never to return, for which we should be truly grateful! Aging, sentimental souls may relate their little fiction concerning the glamor and glory of the gay nineties, but they certainly are not describing life in the foundry of that period, for it requires little analysis to show it



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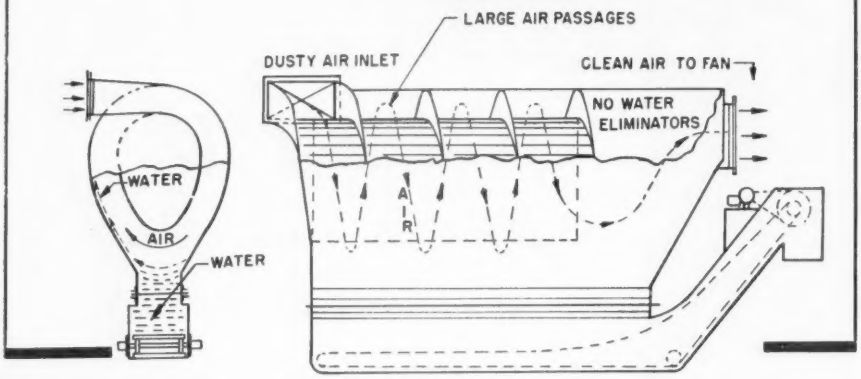

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was neither glamorous nor glorious. Although it is true that Benvenuto Cellini lived and worked in an atmosphere of romance while producing his masterworks in bronze, and his successors in the art of statuary molding are regarded as aristocrats of the foundry, their standing in no way reflects that of the industry as a whole. They belong to the jewelry trade.

The foundry apprentice of the early 1900's and prior years led an unenviable existence. He worked long and hard hours. He was the butt of every joke and indignity his superiors could gleefully perpetrate. He was known as a "punk" and treated with all the contempt that term implies. From early morning until late at night, no task was too menial for him to perform. In a cold and drafty shop, he tucked bars and gaggers with bleeding fingers, for such was the order of the day. Sanitary and safety precautions and measures were nonexistent. If injured, he had no first-aid man or company doctor to turn to—on company time. He was expected to punch out, go home and get along as best he could. The next time a foundryman talks to you about the good old days—spit in his eye!

Small boys in school whose fathers were molders rarely mentioned the fact. It was like having an insane relative—something one didn't talk about. The second-story man and the safecracker seemingly worked in a less stigmatized occupation. The foundry seemed a sort of discredited orphan among the basic industries. Castings, especially gray iron, were looked upon with a certain degree of contempt as both weak and brittle, quite worthless for anything but sashweights, stoves and sewers. It has been a long climb from that 20,000-pound iron to one hovering close to the 100,000 mark —but a climb that we can be proud of.

The sandman of those early days was any helper or apprentice who happened to be available. A facing-mix was considered expensive, and it was used sparingly. To every four wheelbarrows of old sand spread out on the mixing floor, one wheelbarrow of new molding sand was added, then seacoal in the supposed ratio of one to ten. This meant that for every ten heaping shovels of moist sand, one scant shovel of dry seacoal was sprinkled over the surface.

The batch then was "cut over" two or three times with a shovel, tramped under foot, moistened with a sprinkling can, recut by shovel, then tossed through a slanted half-

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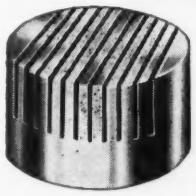
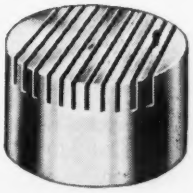
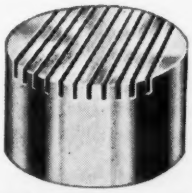


X-TRA DEEP HEAD .156 Wide Slots .014

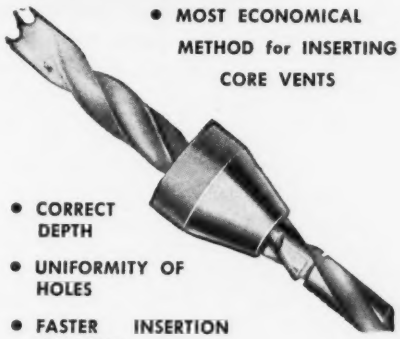


DEEP HEAD .093 Wide or Narrow Slots .014 .010



SHALLOW HEAD .031 Wire or Narrow Slots .014 .010

INSERTING DRILL



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inch screen. Yes indeed, that mix was both poor and expensive. A ton of mold-facing now is mulled properly and painlessly in four minutes. In the old days, a poor imitation would have required a strenuous hour or more. Good old days?

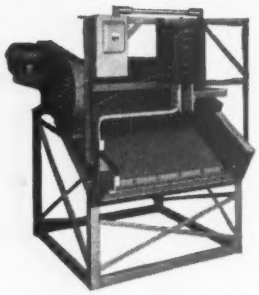
Then as now, water was the determining factor in our sand mixes. Today we maintain control to within two or three-tenths of a percent. Then we accepted a variation of from two to four per cent of a given "feel." When sand felt too wet, the molder shoveled in dry backing sand, rammed softer and increased the use of his vent wire. If the castings came heavy and out of shape, well, it just couldn't be helped. High loss was like the weather—something one had little control over. Of course, some foundrymen were better than others. This writer worked in foundries, both here and abroad, where 50 per cent loss at the shakeout caused no surprise whatever. The business was conducted on that basis; and in those shops the molder mixed his own sand, poured his own floor and sometimes made his own cores. So he had no one to blame but himself for the disgraceful result.

When all things are considered it is remarkable that yesterday's foundrymen were able to remain in business at all doing as well as they did. Despite a rather widespread apathetic attitude in the foundries of that day, there were many progressive foundrymen who insisted upon better practice. It was their work which paved the way for all that we now enjoy.

The old foundry days are gone, and I shed no tears at their passing, but I would not, if I could, change a word of that history, or the memories I have of it, for without the trials and tribulations of yesterday, our rewards and inheritance would be meaningless.

Metallurgical Scholarship Is Established By AIME

An annual scholarship in the Department of Metallurgy of Carnegie Institute of Technology, Pittsburgh, has been established by the National Open Hearth Committee of the American Institute of Mining and Metallurgical Engineers. Funds for the scholarship were provided by the committee to honor Leo Reinartz, vice president of Armco Corp., for his work during formation of the committee. The scholarship award will be used to attract outstanding young men to the field of metallurgical engineering.



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To reclaim foundry sands economically, even those that are damp or sticky, use the Leahy® Vibrating Screen equipped with FlexElex heating of the screen jacket. This efficient combination is especially valued because of its ability to stay on the job continuously without stops for screen cloth cleaning. FlexElex electric heating of the jacket and Leahy Differential Vibration combine to keep the mesh wide open for full capacity production hour after hour and day after day. Send for Bulletin 15-J.

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Rights of Employers in Employees' Inventions

They Are Limited in the Absence of a Contract

By Albert W. Gray

A FEW years ago an employee of an engraving and electrotype company assigned to his employer a patent on a process for the manufacture of metal molds for use in electrotyping. For this he was to receive a royalty.

When the royalty was not paid the employee sued. The defense of the employer was that since the invention had been planned and perfected on the employer's time and facilities, the employer was entitled to its use without compensation and that there was no legal obligation for royalty payment.

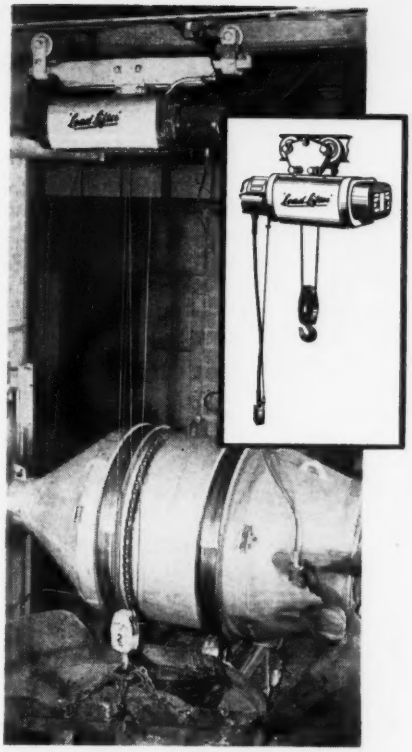
"There is some popular notion," said the court in awarding a judgment to the employee, "that so far as concerns inventions, employees sell their brains to their employers, but that is not the law. On the contrary, the Supreme Court has thoroughly established that while certain shop rights in inventions made by an employee while engaged in the work of his employer may accrue to the employer, no title thereto passes unless there be a plain and unambiguous contract by the employee to turn it over to his employer. Only by such a contract can title to the employee's invention be obtained."

Have Certain Rights

Over a century ago the Supreme Court made a decision which has served to establish this principle: That while an employer has a right to the use of a patented discovery developed by an employee on shop time and facilities, the invention and its patent belong to the employee.

Before that time efforts had been made to discover a method for casting iron rolls so that when the metal was introduced into the mold it would cause a rotary motion by which the dross would be thrown into the center instead of to the surface of the cylinder. A process overcoming this difficulty was discovered and patented by an employee of a foundry in western Pennsylvania. The development of the process had been carried on by the employee during work hours and with the facilities of the foundry, which insisted on that account that it had a legal right to the free use of the invention.

The Supreme Court in sustaining this right claimed by the foundry said of circumstances of this char-



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Wherever the two-speed Series "700" 'Load Lifter' Electric Hoist handles foundry work, economy gets a lift. The slow, creeping speed — 1/3 that of *high* — doesn't vary with the load. Molds are set or parted, patterns are drawn, flasks are closed — many other delicate lifting jobs are done accurately, smoothly and safely on *low* speed. For lifting loads fast and efficiently, without jerky starts, high speed also responds to the push of a button.

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acter, that, "They would fully justify the presumption of a license, a special privilege or grant to the foundry to use the invention. The circumstances amounted to a consent and allowance of such use and show such a consideration as would support an express license or grant or call for the presumption of one to meet the justice of the case by exempting the foundry from liability; having equal effect with a license and giving the foundry a right to the continued use of the invention."

That same court nearly a century later said of this principle of law:

"Though the mental concept is embodied or realized in a mechanism or a physical or chemical aggregate, the embodiment is not an invention and is not the subject of a patent.

"This distinction between the idea and its application in practice is the basis of the rule that employment merely to design or to construct or to devise methods of manufacture is not the same as employment to invent. Recognition of the nature of the act of invention also defines the limits of the so-called shop right which, shortly stated, is that where an employee during his hours of employment, working with the employer's materials and appliances, conceives and perfects an invention for which he obtains a patent, he must accord his employer a non-exclusive right to practice the invention.

"Since the employee uses his employer's time, facilities and materials to attain the concrete result, the latter is in equity entitled to use that which embodies his own property and to duplicate it as often as he may find occasion to employ similar appliances in his business.

"But the employer in such a case has no equity to demand a conveyance of the invention, which is the original conception of the employee alone, in which the employer has no part. This remains the property of him who conceived it, together with the right conferred by the patent, to exclude all others than the employer from the accruing benefits."

References

Deye v. Quality Engraving & Electrotype Co., 100 N.E. 2d 310, Ohio, July 20, 1950.
McClurg v. Kingsland, 42 U. S. 202, (1843).
United States v. Dubilier Condenser Corp., 289 U. S. 178, April 10, 1933.

Stevens Offers Fellowships

Stevens Institute of Technology, Hoboken, N. J., has established fellowships for graduate students working on master's or doctor's degrees. The fellowship fund was donated in the name of Robert Crooks Stanley by his family. Mr. Stanley was a Stevens graduate and chairman of the board, International Nickel Co.

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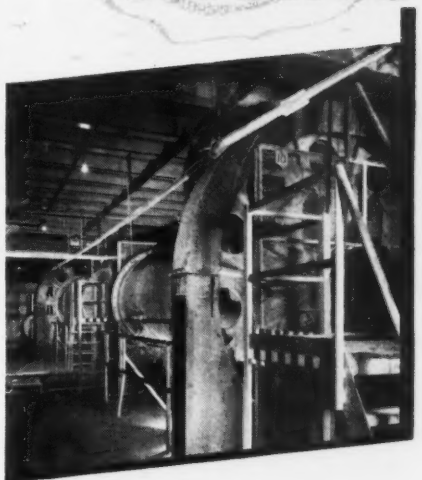

SAND was once a pretty simple thing. You just dug it up and shipped it to people who needed it. That was O.K. some years ago, but sand like everything else has changed. Nowadays sand must be meticulously clean and uniformity is highly critical. Special grinds are needed for special jobs.

High precision casting is making sand specifications tougher and tougher every year. And Wedron is keeping pace. Many thousands of dollars are spent annually by Wedron for new equipment, new processes, experimentation and testing.

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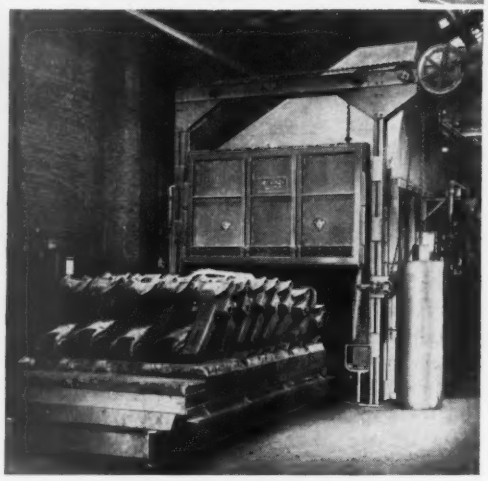

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THE PONDERER

By Harold J. Roast*

IN these days of high production, mechanical accomplishment and material performance, executives find little time for detached thinking. The pressing affairs of every day demand constant attention, rapid decisions and efficient direction. The higher the executive level, the more engrossing the daily tasks become. Appointment follows appointment, and the business day seems scarcely to provide time for all there is to do.

Presidents are no exception. In fact, in many cases, their days are more busy than those of other executives. At least the president has no one else to make decisions for him. Even the signing of documents, notwithstanding the help of mechanical aids, is a time-consuming routine. Is this filling of the day with details in the best interest of permanent progress and the broadening of the basis of any given concern?

Approval today is given to those who can make "snap decisions," rather than to the more careful but slower thinker who rejects an idea until time for careful judgment has been provided.

It has been suggested that the opportunity to think through the important questions that have arisen comes after the regular business day has ended. Since these matters are important, why should they be considered by a brain already tired with the day's work?

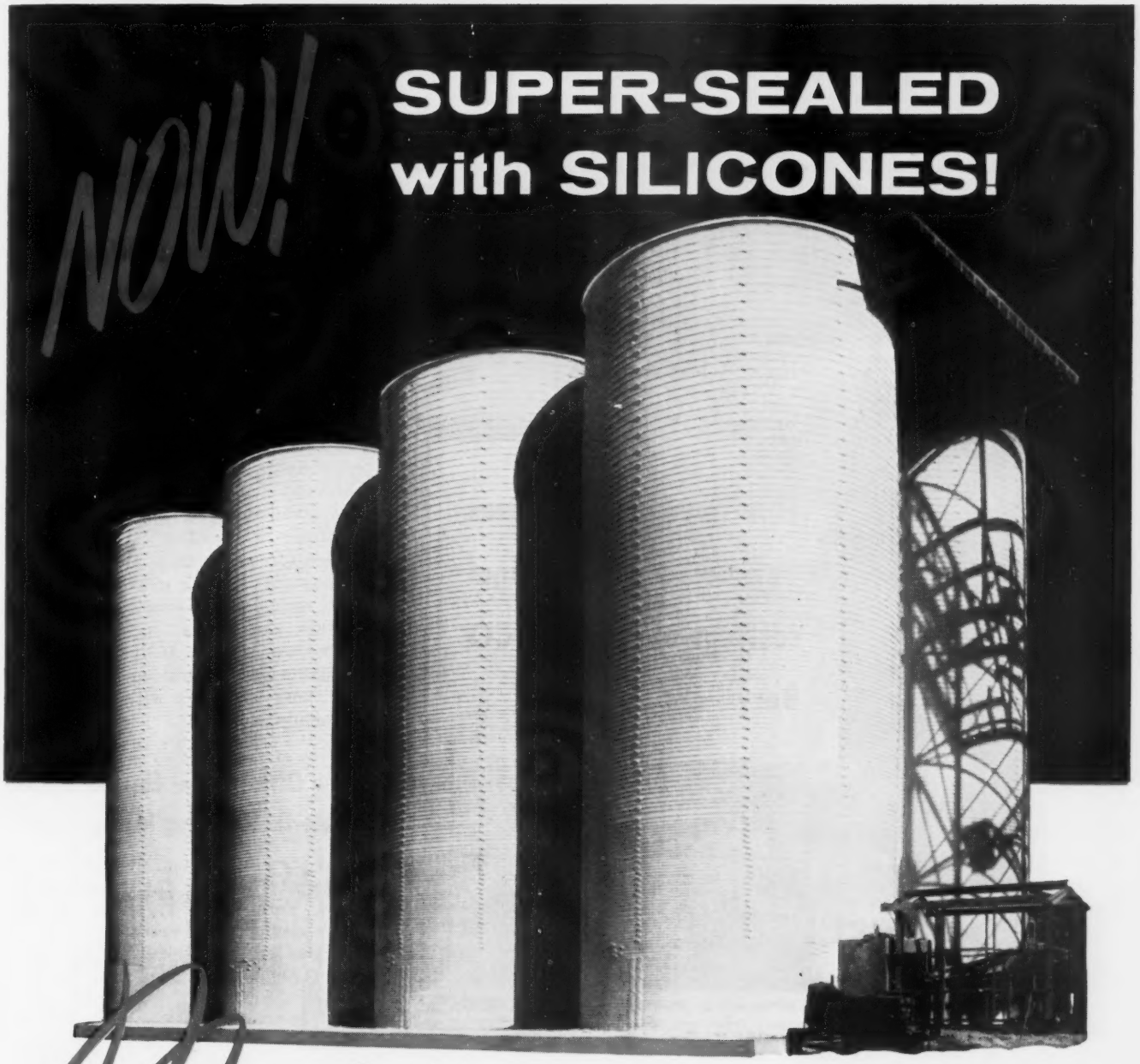
If we admit that major executives are fully occupied during the business day, then it becomes obvious that another position must be provided, the occupant of which need not become involved in any routine, however important. To this position we may give the title "the Ponderer".

To ponder is "to consider thoughtfully" and is not to be confused with "ponderous"—that is, "heavy to the extent of dullness."

The Ponderer should be a major executive, yet detached, so that although he would report to the president, he also would have access through the president to the board of directors.

The Ponderer should have a free rein as to travel and as to joining groups not necessarily directly identified with his company's business. He should be a man of broad education, both science and the humanities, and gregarious by nature so that he can make contacts with the object of securing information applicable, in the widest sense, to the company's business. Judgment rather than

*Bronze Foundry Consultant, Ottawa, Canada.



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Don't risk loss from spoilage or deterioration . . . when expertly-engineered Marietta Industrial Storage Systems provide superior protection . . . and cut wastage! Modern Marietta Concrete Storage Silos built with Air-Cell or solid concrete staves provide three lines of defense against the ravages of moisture and freezing cold . . . heavier, stronger staves, plus flexibility of design . . . and an outside finish coat sealed with an impenetrable film of silicone compound which also prevents staining and efflorescence; insuring you that your Marietta Concrete Storage System will not only look better, but serve you longer!

Write for catalog giving details today . . . find out how a Marietta-designed storage system can improve your handling facilities and lower operating costs.

ADDED STRENGTH is provided by full 3⅝" thick precast concrete staves and heavy hooping . . . more than ample to support heavy vibrators, shaker screens and other needed equipment on silo tops or sides . . . where deadweight of silo storage system is a factor, staves may be supplied cast from lightweight aggregate.

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knowledge should be a prerequisite, and this stipulation connotes an age over the half-century mark.

It should be the Ponderer's responsibility to keep in touch with every phase of his firm's operation—manufacturing, sources of supply of raw material, working conditions, reactions between employee and employer and problems encountered in production. He should maintain friendly relations with customers and, last but not least, study public relations. Because all this must be done without interferring with such of these duties as are the main concern of others, he must be tactful. He must be up-to-date as to world happenings, especially those that may affect his company's activities.

It may be said that the president should undertake these responsibilities, and it is true that he is or should be directly interested in them. Here, however, enters the time element. Therefore the president has every reason to appoint one who has no detailed or routine obligations, but can devote himself, unharassed, to the estimation of the relative values of the numerous developments both within and without the company's interests that may affect its growth and progress.

The creation of the position of "Ponderer," by whatever name it may be labeled, should be of definite and permanent benefit to those companies by whom it is adopted.

Typical centrifugal castings of "Berylco" beryllium copper, poured by the Janney Cylinder Company, Philadelphia, for classified use.

The great natural advantages of beryllium copper—its combination of high strength, thermal and electrical conductivity, resistance to corrosion and wear—are enhanced by centrifugal casting, the Janney Cylinder Company finds. "Berylco" centrifugal castings have a dense uniform structure, of small grain size, free from porosity, gas holes, etc. "Berylco" castings made this way approach wrought material in final properties. Rockwell hardnesses run 3-5 points higher than a conventional casting of the same analysis. Such physical properties as elongation, yield strength, tensile strength, and reduction in area are sometimes increased 10-20%. Directional property differences are decreased.

The castings shown here weigh in the neighborhood of 225 lb. General size limitations are 36″ O.D. for tubes, 48″ O.D. for rings, 3″ maximum wall thickness, and 120″ maximum tube length.

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Water Treatment Data Book Is Offered to Engineers

Revised reference data book No. 2478A has been prepared by the Permutit Co., 330 West 42nd St., New York 36, N. Y., and covers a multitude of subjects of interest to engineers. Subjects discussed include hydraulics, impurities in water, chemical conversions, coagulant, acid and alkali dosages, chemicals, water treatment processes, boiler feed makeup requirements, alkalinity relationships, specific gravities, chemical reactions, hydraulic conversion factors, and others.

The 5½ x 7-in., 108-page book is available to practicing engineers and those who work with water conditioning problems.

New Officers Are Elected By Material Handling Institute

At the ninth annual meeting of the Material Handling Institute held in New York, Dec. 14, new officers were elected. New president is R. H. Davies, vice president, Industrial Truck Division, Clark Equipment Co., Battle Creek Mich.; first vice president is George G. Raymond Jr., executive vice president, Raymond Corp., Greene, N. Y.; and second vice president is C. H. Strauss, partner, Ironbound Box & Lumber Co., Hillside, N. J. Mr. Davies succeeds Charles B. Elledge, General Electric Co., Schenectady, N. Y. The institute membership includes major manufacturers of material handling equipment.

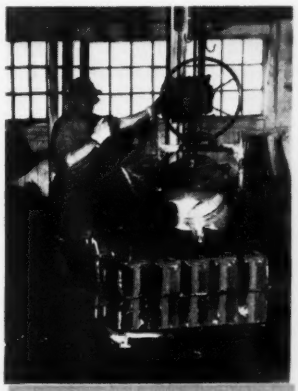
Shell Molding Research Report Is Issued by U.S. Government

Research directed toward lowering costs of the shell molding process is described in a report just released by the U. S. Department of Commerce's Office of Technical Services. The report, "Research on Shell Molding," details ways to make satisfactory shells with less phenolic resin. The 54-page report is available from OTS, U. S. Department of Commerce, Washington 25 for $2.

The Keen Foundry Company, Griffith, Indiana began operations in 1927 with an output capacity of 100 tons per month. Today this same company utilizes ten acres of ground and has a capacity of more than 750 tons of castings per month—conclusive proof of product quality and customer satisfaction.

OTTAWA

SILICA SANDS



Dry Sand molding department mechanical pouring in assembled cylinder molds made up of core sand—7 cores in each mold.

Keen castings require a minimum of finishing time due to uniformity control and good foundry practice. These are finished cylinders and other typical castings ready for shipment.

To insure smooth casting finish, sharp detail, high machining quality and few defects, Keen has demanded the finest silica sand available. For the past twenty years the Goebig Mineral Supply Co. of Chicago has supplied Keen with just such a sand from the world's finest deposits of St. Peter's sandstone in Ottawa, Illinois. Processed in Ottawa Silica Company's three great mills, Ottawa sands are constantly uniform and 99.89% pure by actual test.

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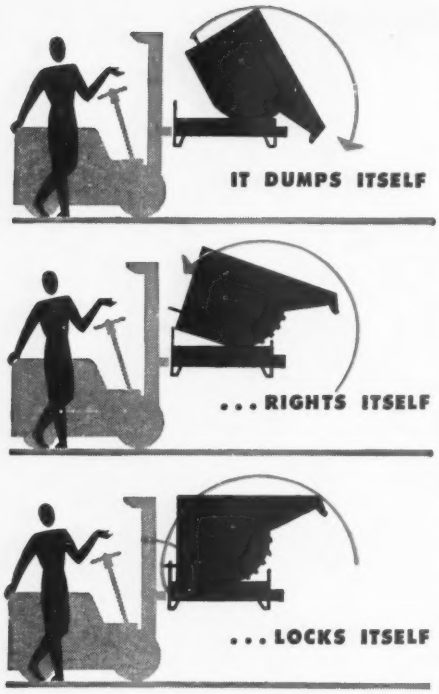

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TRADE PUBLICATIONS

For more details on these items use reply card—page 223

HIGH-STRENGTH ALUMINUM: Federated Metals Division, American Smelting & Refining Co., 120 Broadway, New York 5, N. Y.—Natural aging curves for a high-strength aluminum casting alloy that ages at room temperature with high mechanical properties equivalent to those obtained by heat treatment are presented in bulletin 103. Special characteristics and features of the alloy are included.
For More Details Circle No. 141—Page 223

AIR BLAST CONTROL: Kathabar Division, Surface Combustion Co., Toledo 1, O.—Metallurgical advantages of blast air moisture control are described in Vol. 5, No. 4 of the *Humidity Engineer*. Data and tables of tests performed by Battelle Memorial Institute on cupola dry blast are included with a description of an operating moisture control system.
For More Details Circle No. 142—Page 223

CHROMIUM COPPER ALLOYS: Niagara Falls Smelting & Refining Division, Continental Copper & Steel Industries Inc., 2204-2214 Elmwood Ave., Buffalo 23, N. Y.—January issue of *Better Castings* tells how to make chromium copper casting alloys. Melting charges, fluxes and deoxidizers, melting procedure and heat treatment are topics covered.
For More Details Circle No. 143—Page 223

SAFETY SPECTACLES: United States Safety Service Co., Kansas City 6, Mo.—New lightweight industrial safety spectacles that combine shatterproof corrective lenses are made of compounded resins. Frames, available in a choice of colors, are described in a folder. Styles, shapes and actual colors are pictured.
For More Details Circle No. 144—Page 223

THERMOCOUPLE ELEMENTS: Claud S. Gordon Co., 3000 South Wallace St., Chicago 16, Ill.—New bulletin illustrates and describes thermocouple elements and bare thermocouple wire. Application data for the various types of elements and the different metals and ordering information are included.
For More Details Circle No. 145—Page 223

ELECTRODE CONTROL: Askania Regulator Co., 240 East Ontario St., Chicago 11, Ill.—New arc furnace electrode system of hydraulically positioning arc furnace electrodes is described in bulletin 162.
For More Details Circle No. 146—Page 223

ABRASIVE BAND WHEELS: Even-Cut Abrasive Band Co., 8212 Carnegie Ave., Cleveland 3, O.—Bulletin pictures three types of abrasive band wheels available—round shank units for chuck mounting, wheels with threaded shanks for attachment to threaded spindles and heavy-duty aluminum insert flange models drilled for arbor mounting. Range of sizes, type and size of abrasives and application photos are included.
For More Details Circle No. 147—Page 223

DUCTILE IRON: International Nickel Co., 67 Wall St., New York 5, N. Y.—Use of ductile iron in the center frame for a large diesel engine and in a log chipper are described in Vol. 8, No. 1 of *Nickel Topics*. Also covered in the issue are high-strength nickel alloy bronze castings.
For More Details Circle No. 148—Page 223

BLAST CLEANING: American Wheelabrator & Equipment Corp., 1102 South Byrkit St., Mishawaka, Ind.—Bulletin 124-B describes an airless blast tumbling machine which has a capacity of 17½ cu ft. Specifications, installation views and a set of case histories are included.
For More Details Circle No. 149—Page 223

CONVEYOR CATALOG: Samuel Olson Mfg. Co., 2429-41L Bloomingdale Ave., Chicago 47, Ill.—New conveyor catalog illustrates portable stacking, floor to floor, horizontal belt, gravity roller, and gravity wheel conveyors in a wide range of types and sizes.
For More Details Circle No. 150—Page 223

BURNER NOZZLES: Eclipse Fuel Engineering Co., 1001 Buchanan St., Rockford, Ill.—Cast iron burner nozzles designed to operate at higher mixtures than normal are described in bulletin H-15. Dimensions, installation information and operating data are included.
For More Details Circle No. 151—Page 223

AIR MOTORS AND VALVES: Bellows Co., 222 West Market St., Akron, O.—Bulletin SP-50 illustrates and describes dimensions and specifications of air motors and valves. Included are 75 illustrations and 27 specification charts. Size and capacity designations are given.
For More Details Circle No. 152—Page 223

PARTING COMPOUND: Acheson Colloids Co., Division of Acheson Industries, Port Huron, Mich.—Illustrated bulletin 427 discusses the use of colloidal graphite as a parting compound. Applications are shown for many industrial uses.
For More Details Circle No. 153—Page 223

HAND LIFT TRUCKS: Market Forge Co., Materials Handling Division, 33 Garvey St., Everett, Mass.—Features to look for in selecting hand

lift trucks and hand pallet trucks are given in bulletin 1005-A. Descriptions, diagrams and illustrations of design and construction with regard to safety, performance and ease of maintenance are included.

For More Details Circle No. 154—Page 223

FLEXIBLE SHAFTS: Franklin Balmar Corp., N. A. Strand Division, Woodberry, Baltimore 11, Md.—Flexible shaft machines and accessories are presented in catalog C-210. Tabular data on single-speed direct drive, multiple-speed countershaft drive and multiple-speed gear drive machines are presented. Useful tables on operating speeds of grinding wheels are included.

For More Details Circle No. 155—Page 223

STEEL PULLEYS: American Pulley Co., 4200 Wissahickon Ave., Philadelphia 29, Pa.—Pictorial review of steel pulleys, their manufacturing processes and some of their end uses are given in a 16-page brochure. Manufacturing techniques and personal skills required to produce precision-made steel pulleys for power transmission, material conveying, railroad car lighting, heating and air conditioning and for textile machinery are graphically illustrated.

For More Details Circle No. 156—Page 223

VALVE CATALOG: Edward Valves Inc., Subsidiary of Rockwell Mfg. Co., 1201 West 145th St., East Chicago, Ind.—Condensed catalog 105 provides information on valves for a wide variety of applications. Dimensions and illustrations are given for stop-check valves, globe and angle stop valves, angle univalves and small size globe valves.

For More Details Circle No. 157—Page 223

CONTROL SYSTEMS: John C. Whiddett Co., 9 Union Ave., Bala-Cynwyd, Pa.—Information on how packaged control systems and the expanding science of automation fit into the operation of the smaller industrial firm is given in a new booklet, "Packaged Control Systems and Representative Applications."

For More Details Circle No. 158—Page 223

INDUSTRIAL CATALOG: General Industrial Co., 5725 North Elston, Chicago 30, Ill.—Steel shelving, lockers, storage cabinets, communication systems and plastic drawer cabinets are among the many items illustrated and priced in a new catalog.

For More Details Circle No. 159—Page 223

ELECTRIC TRUCKS: Lewis-Shepard Products Inc., 1053 Walnut St., Watertown 72, Mass.—Lift trucks, walkie pallet trucks and walkie trucks for handling skid platforms are illustrated in a four-page folder.

For More Details Circle No. 160—Page 223

BARREL FINISHING: Minnesota Mining & Mfg. Co., 900 Fauquier St., St. Paul 6, Minn.—Two new booklets

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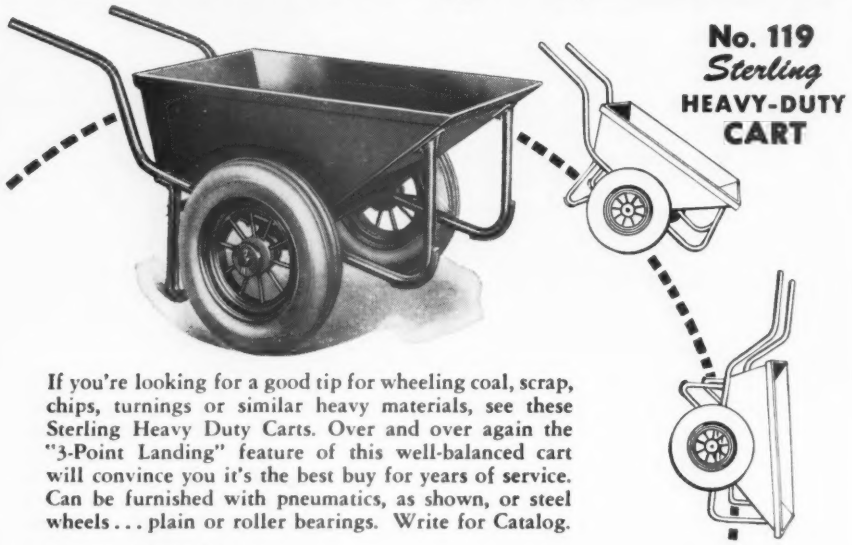

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describing barrel finishing techniques and products are available. "Barrel Finishing" explains how barrel finishing works, what types of parts can be finished and what operations are performed. "Abrasive Chips and Compounds for Barrel Finishing," details the differences between finishing chips and gives specifications of compounds available for cutting, finishing and cleansing operations.

For More Details Circle No. 161—Page 223

INDUSTRIAL TRUCKS: Magnesium Co. of America, Tobey Aluminum Division, East Chicago, Ind.—Data file describes weight, flexibility and caster advantages of aluminum industrial trucks. Included are specifications for various sizes and styles of flatbed, multiple-deck and A-frame trucks as well as information on removable sides, ends and other accessories.

For More Details Circle No. 162—Page 223

BOOKBINDING: Tauber Plastics Inc., 200 Hudson St., New York 13, N. Y.—New booklet shows how every office can bind its own catalogs, presentations, and booklets in colorful plastics at low cost. All types of equipment and plastic materials available for five styles of plastic binding are shown.

For More Details Circle No. 163—Page 223

INDUSTRIAL FANS: Bayley Blower Co., 1817 South 66th St., Milwaukee 14, Wis.—Bulletin EX-531 provides selection tables from which the correct fan for the required capacity can be determined quickly. Complete descriptive information, detailed capacity tables and data are included.

For More Details Circle No. 164—Page 223

PREMIXED MORTAR: Master Builders Co., Subsidiary of American-Marietta Co., 7016 Euclid Ave., Cleveland 3, O.—Two bulletins give information on premixed grout and premixed mortar. Common methods of grouting and forming are diagramed and a table of compressive strength is included.

For More Details Circle No. 165—Page 223

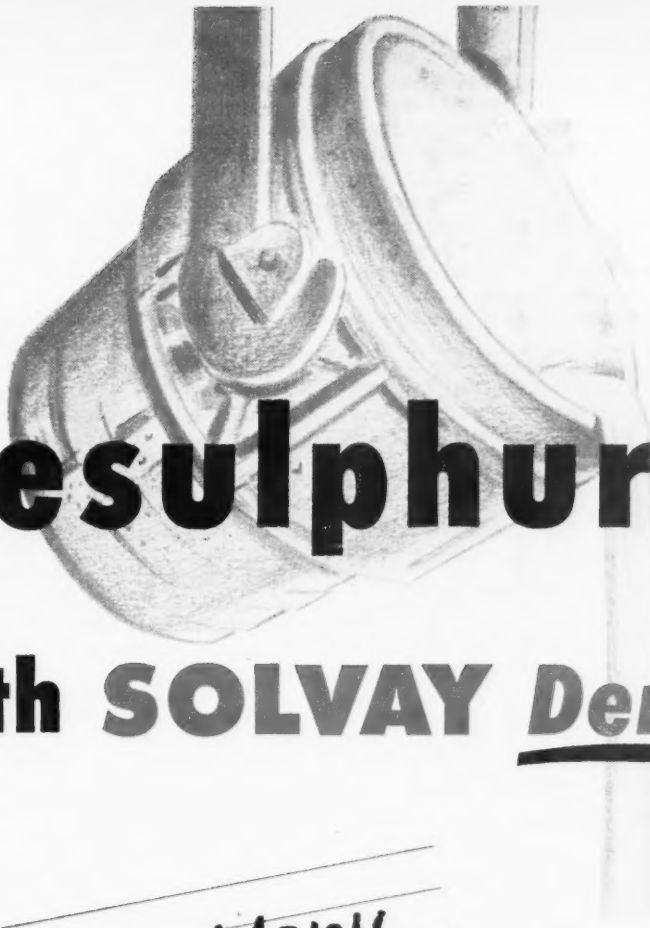
FILTER CLOTH: Porous Plastic Filter Co., 30 Sea Cliff Ave., Glen Cove, N. Y.—Data on filter cloth for use in dust bag collection systems is given in bulletin T-112. Information on chemical resistance, temperature resistance, flow capacities and physical properties is included.

For More Details Circle No. 166—Page 223

WIRE CONNECTORS: Buchanan Electrical Products Corp., Hillside, N. J.—Illustrated pocket-size booklet contains information on actual field uses of connectors used for solderless wire splicing and terminating, in both contractor and original equipment applications.

For More Details Circle No. 167—Page 223

BUS CONDUCTORS: Industrial Service Division, Kaiser Aluminum & Chemical Sales Inc., 1924 Broadway, Oakland 12, Calif.—New brochure details the availability, properties, advantages and methods of joining and bending aluminum bus con-



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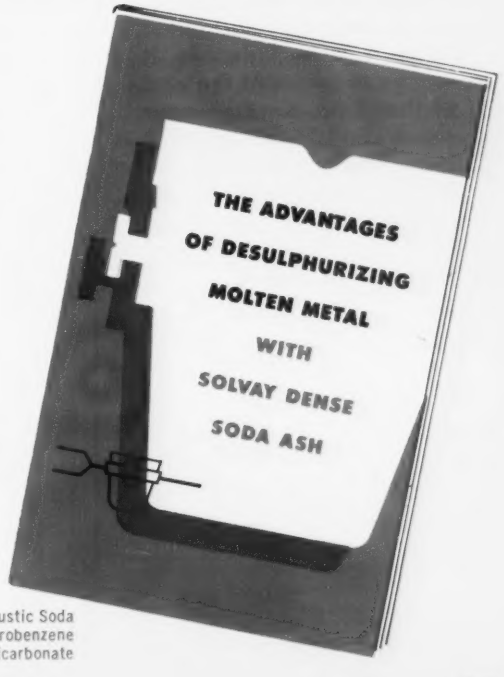

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ductors. Information on thermal, electrical and physical properties, weights and tolerances, alloys and sizes of bus conductors is tabulated.
For More Details Circle No. 168—Page 223

STOCK GEARS: Universal Gear Works, 1301 East McNichols, Detroit 3, Mich.—New 200-page catalog gives specifications and prices of over 8000 stock items including gears, sprockets, chains and splines. Drilling units, dust collectors, coolant systems, grinders and other related items are covered. Manufacturing facilities are pictured.
For More Details Circle No. 169—Page 223

RECORDING INSTRUMENTS: Bristol Co., Waterbury 20, Conn.—Complete line of recording automatic controlling and telemetering instruments is covered in bulletin DMO35. Also described are recorders and controllers for temperature, flow, liquid level, mechanical motion, running time, count and speed.
For More Details Circle No. 170—Page 223

GRATING: Dravo Corp., 1203 Dravo Bldg., Pittsburgh 22, Pa.—Bulletin 1105 describes interlocked and welded grating and stair treads. Tables list the grating weights, standard sizes of safety stair treads, panel widths and the safe bearing loads for various bearing-bar spacings.
For More Details Circle No. 171—Page 223

EXHAUST UNITS: M & E Mfg. Co., Indianapolis 5, Ind.—Exhaust units, exhaust hoods and canopies, paint spray booths, roof ventilators, accessory equipment and fan assemblies are pictured in bulletin F 52. Performance ratings and dimensional specifications are included.
For More Details Circle No. 172—Page 223

TRACTOR SHOVEL: Allis-Chalmers, Tractor Division, Milwaukee 1, Wis.—Construction features, specifications, hydraulic system and a complete line of attachments are illustrated in a 16-page brochure, MS-456-654.
For More Details Circle No. 173—Page 223

ADJUSTABLE SHELVING: Standard Pressed Steel Co., Box 838, Jenkintown, Pa.—Outstanding features of adjustable steel shelving are shown in an illustrated folder. Various types of swinging and sliding doors are featured.
For More Details Circle No. 174—Page 223

COMPRESSORS: Pennsylvania Pump & Compressor Co., Easton, Pa.—Air and gas compressors available in 25 to 100 hp ratings are described in bulletin 601. Sizes, capacities and ratings are tabulated.
For More Details Circle No. 175—Page 223

FURNACE WALLS: Bigelow-Liptak Corp., 2550 West Grand Blvd., Detroit 8, Mich.—Catalog describes unit suspended walls and arches for industrial furnaces.
For More Details Circle No. 176—Page 223

MATERIALS HANDLING: Phillips Corp., 14 Arch St., Carnegie, Pa.—Bulletin EE-C illustrates materials handling equipment, ranging from

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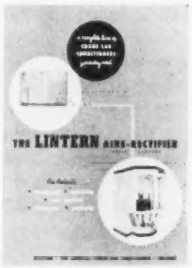
For More Details Circle No. 177—Page 223

ALUMINUM ALLOY: Aluminum Smelting & Refining Co., 5463 Dunham Rd., Bedford, O.—Physical and chemical properties of a high-strength aluminum alloy used for making castings with properties that compare with heat treated castings are given in a new specification sheet.
For More Details Circle No. 178—Page 223

WELDING FILLER METALS: Arcos Corp., 1500 South 50th St., Philadelphia 43, Pa.—New chart keys by use a line of filler metals for welding. Methods covered are metal arc, submerged arc, tungsten electrode, metallic electrode, oxyacetylene and atomic hydrogen.
For More Details Circle No. 179—Page 223

CAB CONDITIONING: Lintern Corp., Route 20 East, Painesville, O. —Crane cab air conditioning units are described and illustrated in a new 20-page bulletin. Equipment and experience developed in 14 years of air conditioning crane cabs exposed to temperatures as high as 230° F is offered. Both existing and new cranes can be air conditioned. Extent of crane cab air conditioning is examined in bulletin AC-549.



For More Details Circle No. 180—Page 223

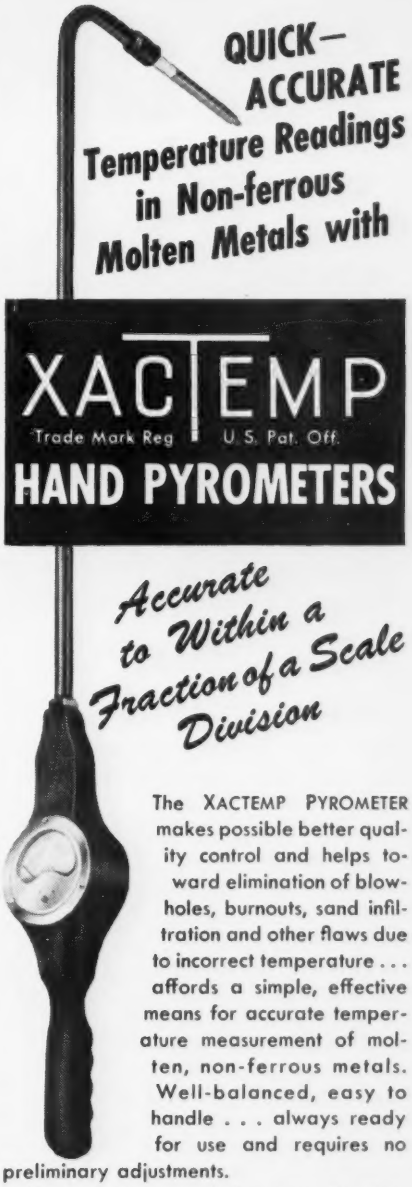
LIFT TRUCKS: Yale Materials Handling Division, Yale & Towne Mfg. Co., 11000 Roosevelt Blvd., Philadelphia 15, Pa.—Gasoline, diesel and liquid petroleum gas lift trucks in capacities ranging from 1000 to 10,000 lb are described and illustrated in bulletin 5105C.
For More Details Circle No. 181—Page 223

MOTOR SERVICE: Lima Electric Motor Co., 112 Findlay Rd., Lima, O. —New service brochure lists the names and addresses of authorized service stations, representatives and factory distributors all over the country.
For More Details Circle No. 182—Page 223

TITANIUM TUBING: Superior Tube Co., 1793 Germantown Pike, Norristown, Pa.—Information on the fabrication of unalloyed titanium tubing is given in bulletin 43. Subjects covered include heat treating, pickling, welding, brazing and machining.
For More Details Circle No. 183—Page 223

METAL FINISHING: Carborundum Co., Niagara Falls, N. Y.—Metal buffing, metal tumbling and pressure blasting are discussed in booklet 14. Latest abrasive engineering recommendations, charts and illustrations are included.
For More Details Circle No. 184—Page 223

BUILDING PRODUCTS: Aluminum Co. of America, 753 Alcoa Bldg., Pittsburgh 10, Pa.—Aluminum industrial building products—roofing and



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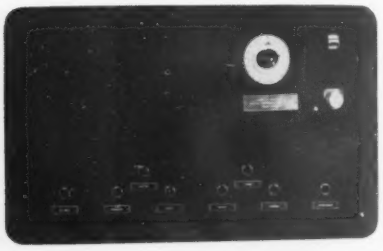

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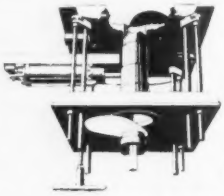

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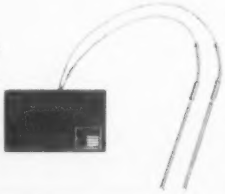

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siding, flat flashing stock, fasteners and perforated corrugated sheet—are described in a revised booklet.

For More Details Circle No. 185—Page 223

MATERIAL HANDLING: Clark Equipment Co., Industrial Truck Division, Battle Creek, Mich.—Use of fork lift trucks in a variety of applications is illustrated in *Material Handling News*. Features of fork lift trucks and operational suggestions are included.

For More Details Circle No. 186—Page 223

MOTOR STARTER: Cutler-Hammer Inc., 244 North Twelfth St., Milwaukee, Wis.—New manual motor starter which provides across-the-line starting as well as overload protection for fractional horsepower motors is described in publication EC-61.

For More Details Circle No. 187—Page 223

INDUCTION MELTING: R. Lavin & Sons Inc., 3426 South Kedzie Ave., Chicago 23, Ill.—High-frequency induction melting in the production of nonferrous casting alloys is described in the December, 1954, issue of the *Lavingot*.

For More Details Circle No. 188—Page 223

LOCKER ROOM DESIGN: Moore Co., Advertising Dept., 1036 Quarrier St., Charleston, W. Va.—Standards to be maintained in toilet, shower and locker rooms are given in a 40-page design file. Complete details are given for laying out locker rooms.

For More Details Circle No. 189—Page 223

HEAT CONTROL: Leeds & Northrup Co., 4901 Stenton Ave., Philadelphia 44, Pa.—Controllers and proportional control units are described in folder ND47(7). Features, dimensions and circuits are illustrated.

For More Details Circle No. 190—Page 223

FOUNDRY reprints

Vacuum Degassing of Nonferrous Metals by H. F. Bishop, E. E. Layne and W. S. Pellini presents up-to-the-minute information on practical application of vacuum degassing treatments that may be applied to foundry operations by the use of mechanical pumps.

For a Copy Circle No. 191—Page 223

Coke Quality and Carbon Pickup by C. R. Austin describes tests intended to evaluate the behavior of coke in the cupola, particularly with regard to its carburization power or the facility with which the carbon passes into solution in molten form.

For a Copy Circle No. 192—Page 223

Principles of Risering by Charles F. Walton presents some fundamentals of metal solidification and riser application to assist foundrymen in an important phase of good foundry practice. Story is well illustrated.

For a Copy Circle No. 193—Page 223

Book Reviews

The Light Metals Handbook, by George A. Pagonis, cloth, Vol. 1, 199 pages, Vol. 2, 185 pages, published by D. Van Nostrand Co., 250 Fourth Ave., New York 16. Price $8.50.

Published in two volumes, Vol. 1 covers the text while Vol. 2 consists of tables to be used simultaneously with the text. This arrangement allows the reader to have before him conveniently any specific table referred to in the text. The book is written to serve aircraft, industrial, and civil engineers, fabricators and light metal foundrymen, as well as men developing engineering specifications.

Concise analysis of aluminum and magnesium alloys is presented from which correct selection can be made by comparison of alloying stabilities and chemical reaction characteristics, and by following through the procurement stages to actual testing. Included are data on mechanical properties at room, low and elevated temperatures, physical properties, choice of alloy, casting, formability, heat treatment, corrosion, machinability, joining methods and detailed properties of individual compositions.

The author is well known to many foundrymen, having served as acting chief, Magnesium Section, National Production Authority.

* * *

Quality Control—Second edition, by Norbert L. Enrick, 181 pages, 6 x 9 in., published by the Industrial Press, 148 Lafayette St., New York 13. Price $4.

Some sixty pages of new text, tables and charts have been added to the first edition to provide a more complete and useful discussion of various aspects of quality control. New subjects considered include the coefficient of variation, a variability indicator often useful in processing industries; how and when to use various types of control charts; the interpretation of frequency distribution curves; and the analysis of variations between machines and departments as an aid in locating sources of difficulty.

A simple direct approach is used, with emphasis placed on the practical application of quality control and an understanding of the basic methods. Highly technical language and complicated mathematical formulas are avoided in the interests of the student who needs an understanding of quality control and the practical man who wants to be able to improve the quality of his product and reduce scrap and spoilage. All the essential techniques of modern quality control are covered, as well as administrative procedures and controls.

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THE SHAKEOUT

Power Vise Ends Production Snags

PRODUCTION SNAGS caused by manual clamping of castings on a finish grinding operation at Hills-McCanna Co., Chicago, have been eliminated by a new power vise. The vise avoids metal damage and slippage and permits the operator to save time since he can operate the

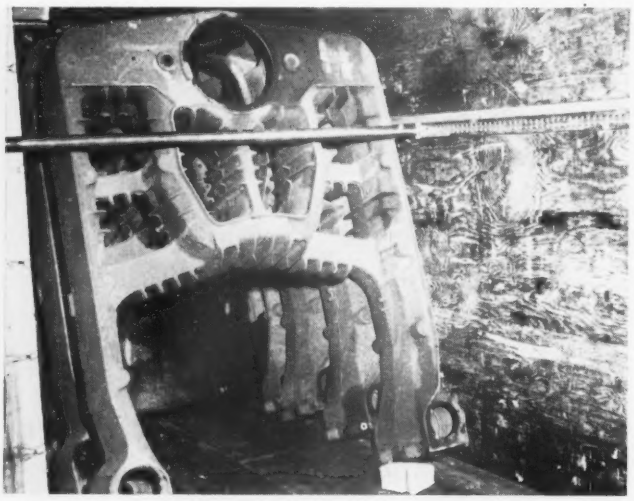
jaws with the foot pedal and move the castings with his free hand.

Made by Wilton Tool Mfg. Co., Chicago, the vise is activated by air and has a booster that multiplies air pressure and converts it into hydraulic gripping force. The operator can preset the vise to the exact pressure needed to hold castings firmly, without damaging the metal.

For More Details Circle No. 207—Page 223

Truck Loading Method Reduces Costs

IMPROVED truck-loading methods have enabled National Radiator Co., Johnstown, Pa., to slash labor-hours for loading and unloading highway trailers by 50 per



cent and to eliminate damage during transit to its cast iron boiler sections and other heating products. An adaptation of a tested method for securing loads in cargo aircraft, the new method uses supports to anchor cargo.

Aluminum extrusions with eyelets at ½-in. intervals are attached to each side of a semi-trailer 32 ft long, and seamless steel tubing is used as cross-members. Among its other advantages, this arrangement eliminates cost and weight of lumber and steel strapping materials formerly used. Cast iron sections hauled successfully have ranged from 50 to 1200 lb and 18 in. to 5 ft tall, from 2 to 12 in. wide and from 1½ to 5 ft long.

For More Details Circle No. 208—Page 223

Lift Truck Can Pull in Its Forks

AN UNUSUAL material handling problem has been solved at the Gary, Ind., warehouse of Northern Indiana Public Service Co. by the use of a compact fork lift truck manufactured by Towmotor Corp., Cleveland. Known as the LT-35, this truck is equipped with special modified forks that make it possible for it to fit into very small places. The illustration shows how the forks fold back over the truck, permitting it to be lifted to other floors in a small elevator.

Actually, the forks are standard Towmotor forks fastened only at the top, left free at the bottom. This arrangement, together with special notches in the carriage, permits the operator to fold back the forks quickly and easily.

Among the heavy jobs the truck performs at the utility company are truck loading, unloading, transporting and stacking of major appliances, 1000-lb reels of wire and heavy transformers.

For More Details Circle No. 209—Page 223

Weighing Molten Metal Improves Operation

WEIGHING MOLTEN METAL cuts costs and improves product quality at Washington Mould, Machine & Foundry Co., Washington, Pa. Pouring used to be done on the basis of estimated weight. Now it's measured by a 0 to 20,000-lb capacity dynamometer manufactured by W. C. Dillon Co., Van Nuys, Calif. Incomplete final pourings, especially on large, expensive jobs, have been virtually eliminated because total remaining weight in the ladle is shown

on the dial. The operator is enabled to control alloy additions to close specifications. As shown here, the unit is placed in series between the crane hook and the ladle, with an asbestos shield between the instrument and the ladle to ward off excessive heat.

For More Details Circle No. 210—Page 223

WE POINT WITH PRIDE TO THIS AWARD

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IN RECOGNITION of its contribution to and membership on a production team responsible for an achievement unparalleled in industrial history—the building by General Motors in the United States of fifty million motor vehicles.

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Write for new Bulletin # 153 Illustrating Model M-WC

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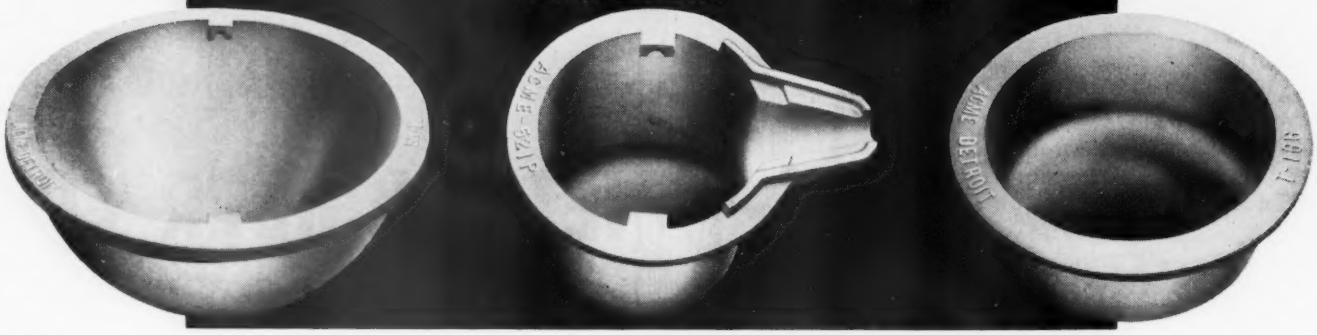

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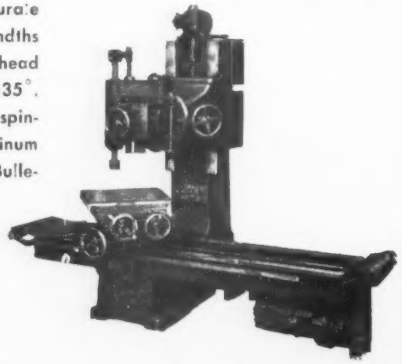

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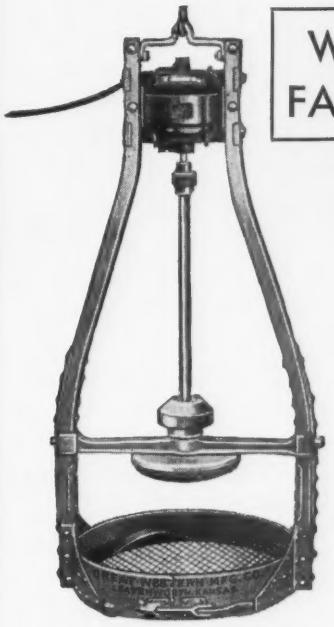

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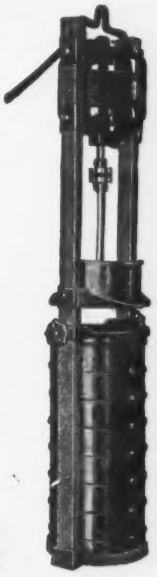

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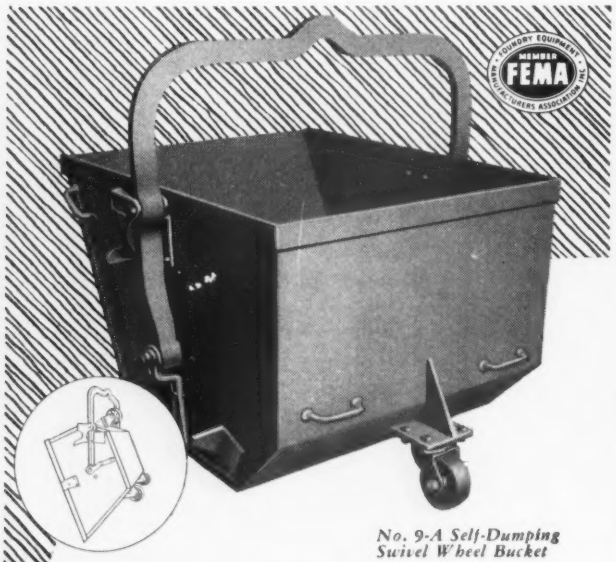

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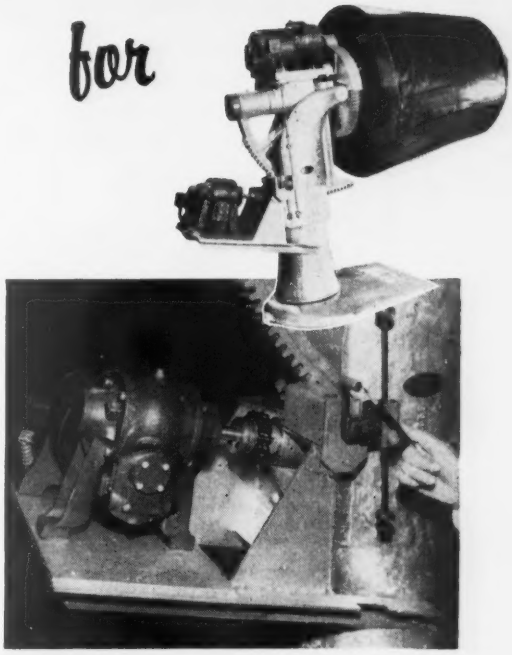

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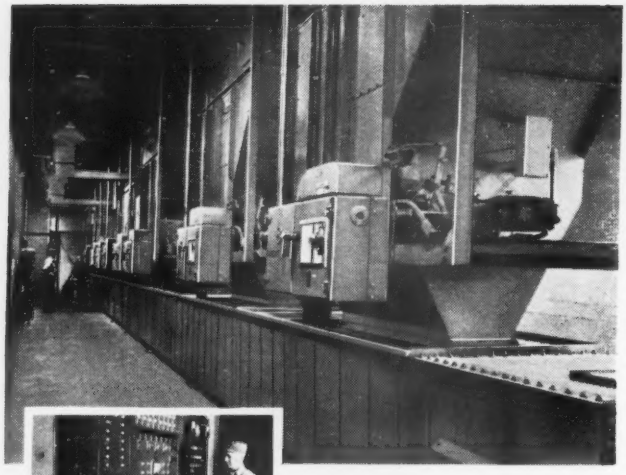

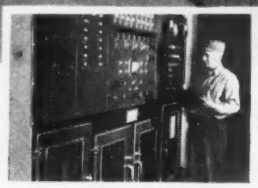

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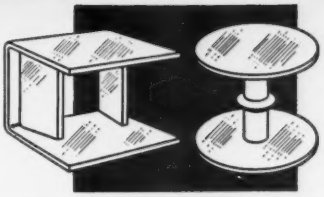

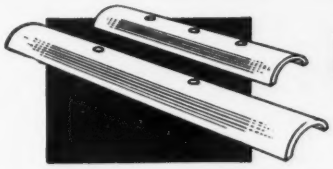

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Pattern Plates

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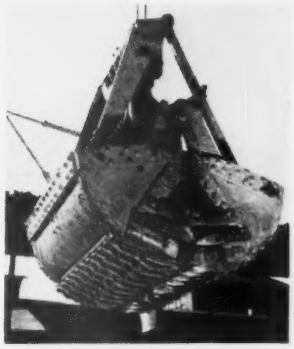
• HANDLE COKE WITH MINIMUM DEGRADATION • HANDLE SAND WITHOUT LEAKAGE

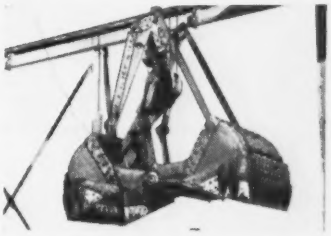
with the same BLAW-KNOX DUAL-PURPOSE FOUNDRY BUCKET



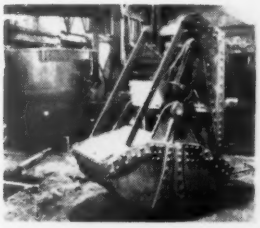
BLAW-KNOX "Shark Tooth" Single-Line Hook-On Buckets cut the cost of rehandling coke, coal, sand, and small limestone because one bucket, with easily attached or removable liner plates, is all you need. With the plates attached, fine granular materials are handled without leakage. Without the liner plates, the "shark teeth" literally finger their way through the coke, so it may be handled with minimum degradation. Hook-On feature permits quick detaching for change to magnet.

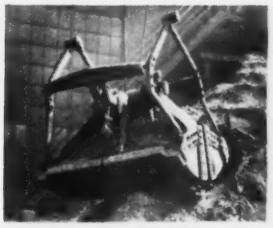
Above — Rated 1-cu. yd. closed head type Blaw-Knox "Shark-Tooth" Bucket, without liner plates, reeved 2-parts for 13'6" headroom. Range of sizes for every requirements.

Right — This open head type Blaw-Knox Bucket, rated 1-cu. yd., is equipped with liner plates for rehandling sand, coal, limestone, etc. Shown reeved 2-parts for 8'9" headroom. Choice of sizes.



BLAW-KNOX BUCKETS
help solve average or unusual conditions





FOR AVERAGE HEADROOM— There's a type and size of Blaw-Knox Single-Line Hook-On Foundry Buckets to meet a wide range of operating conditions. Take advantage of the Blaw-Knox engineering service available without obligation to help you select the bucket best suited to your needs.

FOR LOW HEADROOM—This Blaw-Knox Single-Line Hook-On Bucket solves rehandling problems when headroom is extremely limited. The ¾-yd. capacity bucket requires only 6'7" operating headroom. Also available in larger sizes.

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CONSTRUCTION EQUIPMENT DIVISION
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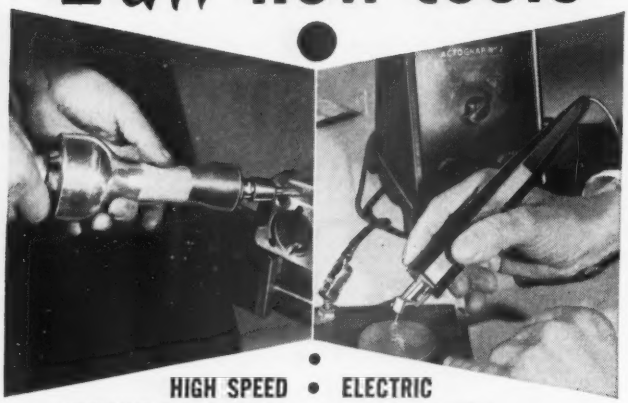

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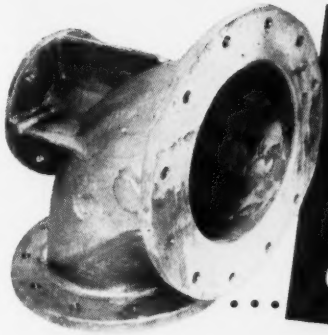

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locks pores permanently

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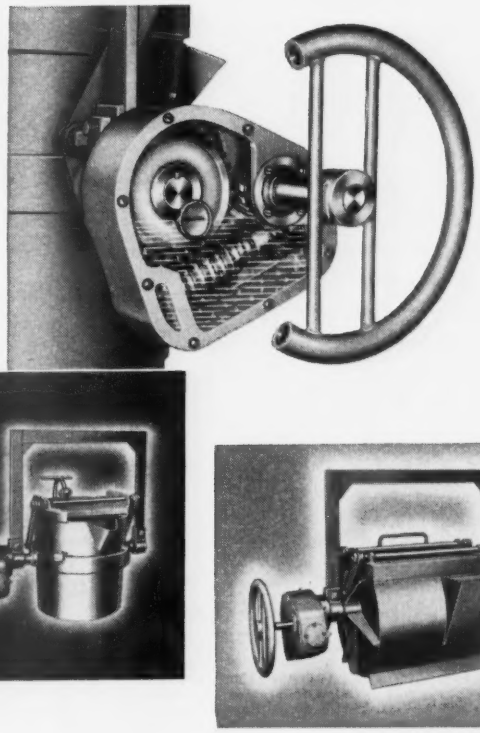

BANTAM *worm ladle gearing*
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Industrial's completely enclosed worm ladle gearing, formerly available only on large ladles, now can start turning in profitable operation for you on small but important pourings.

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The new Bantam is available for use with cylindrical or taper side trolley ladles with capacities as small as 165 pounds.

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Industrial
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CLASSIFIED ADVERTISING

Help Wanted

CORE ROOM FOREMAN

Experienced in steel foundry practice. In replying give complete information which will be held in strict confidence by a single executive.

BOX 430, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

WANTED

STEEL FOUNDRY SUPERINTENDENT

For well established foundry in the Southwest expanding facilities to manufacture steel castings. Prefer graduate engineer 35 to 55 years of age thoroughly experienced in all phases of steel melting procedures and practices, core making, molding, gating and rigging, sand control, heat treating and casting cleaning. Planned production 200 tons per month of mostly pressure type castings weighing 20 to 2000 lbs. Furnish complete work history, references, photograph and salary expectations with first letter. This is a real opportunity for the right man.

BOX 431, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

SUPERINTENDENT

Gray iron foundry with approximate capacity 50 tons daily located Lower Michigan. Light and heavy castings on jobbing floors and machines. Plant well equipped with excellent expansion potential. We are interested only in well trained, capable, aggressive man who will have opportunity within about two years for a top position carrying high financial remuneration and responsibility. Age 50 or under.

BOX 483, FOUNDRY
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CLEANING ROOM FOREMAN

Man to take complete charge in a 400 to 500 ton shop.

Salary commensurate with experience. Age 30—45. Please state previous experience with complete background.

MINNEAPOLIS ELECTRIC STEEL CASTINGS CO.
3800 N.E. 5th STREET
MINNEAPOLIS 21, MINNESOTA

FIRST RATE FOREMAN

Required for fully mechanized foundry in New Brunswick. Must have proven production record, knowledge of ferrous and nonferrous metals, core making and cleaning. Ability to handle men and reduce costs. Excellent opportunity for right man. Full benefits and pension. Write full particulars in strict confidence. Address: Box 455, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY ENGINEER

Challenging position in management engineering for young engineer prepared to travel. Must know gray iron foundry operations, able to make layout drawings. Industrial engineering experience desirable. Reply with photo. Address: Box 458, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

WANTED

Practical process engineer on precision investment castings. Should have metallurgical background plus heavy shop experience. Metropolitan New York area. Address: Box 472, FOUNDRY, 60 East 42nd Street, New York, New York.

Help Wanted

MELTING FOREMAN

FOR MECHANIZED GRAY IRON FOUNDRY New England Foundry needs experienced gray iron man, to supervise cupola operation, assume responsibility for inoculants and alloy additions and run routine foundry tests.

Excellent opportunity for ambitious young man.

Submit full particulars and experience, references and present situation in reply.

BOX 463, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

FOUNDRY SUPERINTENDENT

Malleable iron foundry producing medium to small castings seeks man experienced in all phases melting, molding, gating, sand control and general foundry supervision. Exceptional opportunity for right man. Detailed reply in first letter giving full qualifications including complete work history, references, salary and when available. Replies held in strictest confidence.

BOX 471, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

PRODUCTION FOREMAN

Large malleable foundry has opening for production foreman thoroughly familiar with molding, gating, and risering of malleable iron. Send resume including salary desired.

BOX 467, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

PERMANENT MOLD DESIGNER

Must be experienced. State qualifications and salary expected.

BOX 464, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

SAND SALES ENGINEER

To service foundry sand customers. Foundry experience necessary, sales experience helpful. Part time on new product development. Michigan. State age, education, experience, salary desired. Address: Box 460, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

Qualified for medium size mechanized gray iron foundry located in Midwest town of 25,000. Castings from one pound to several tons. Must have thorough understanding of high production, squeezer, bench, floor molding and sand slinger operations. Might be arranged to bring assistant superintendent with you. Replies confidential. State qualifications, references and salary expected. Address: Box 461, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

WANTED

Manager with sales experience, bronze foundry. Familiar with chilled and centrifugal castings and general line of loose and gated work in bronze. Address: Box 479, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Positions Wanted

EXECUTIVE

Well versed in foundry procedures. Experienced consultant on metallurgy, sand, quality control, melting procedures, production and general foundry problems. Excellent administrator, problem-solver, trouble-shooter. Address: Box 470, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

WEIGHT ESTIMATING

Estimating of casting weights furnished by return mail. Accurate, reliable and confidential service. Automatic calculator equipment. Nominal fee. Send blueprints to: CHARLES E. ROLAND, ITASCA, ILLINOIS.

REPRESENTATIVE

Detroit established steel casting representative, wish to represent an iron foundry. Prefer one located in Michigan. Address: Box 484, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Positions Wanted

MANAGER OR SUPERINTENDENT

Thirty-five years' practical experience in foundry, molder eighteen years. Have been foreman, superintendent and general manager. Did consultation work in various foundries. One was losing $7,000 per month when I started, in seven months it was making good money. Ran three largest foundries in St. Louis, largest one in Chicago. Understand gray iron, semi-steel, brass, aluminum. Know how to rig jobs to get best production at lowest cost. Understand running of cupola mix of various metals; estimating jobs from blueprints. Can give best of references. Available immediately. Address: Box 447, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

MELTING SUPERINTENDENT

A broad experience in electric arc furnace melting of steel and heat resisting alloys. Also experienced in stainless and nodular irons melting in induction furnaces. Good control for chemical and physical specifications. Address: Box 456, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

MAINTENANCE FOREMAN

Desire position in mechanized foundry, experienced electrical and mechanical maintenance. Also experienced jobbing machine shop, technical education, 13 years' supervisory background. Age 38. Address: Box 469, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

YOUNG STATISTICAL ENGINEER

Desire to relocate with progressive firm preferably in the Southwest. Experienced in initiating and supervising statistical quality control. Presently employed. Address: Box 473, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

COREROOM FOREMAN

Well versed in all pnases of coreroom operation. Good rigger of coreblowers, rollover machines, production or jobbing work. Well experienced, sand control, drying, and assembling of cores. Good labor relations. Address: Box 481, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOREMAN STEEL FOUNDRY

Young man, 12 years' experience (mostly floor molding), with journeyman's papers. Have specialized in molding departments and desire experience as a foreman. Married, age 30, willing to relocate. Address: Box 391, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

WORKING FOREMAN

Thirty years' experience, jobbing work, iron, brass, aluminum. All phases foundry work. Prefer small shop. West Coast, age 45. Address: Box 452, FOUUNDRY, Penton Bldg., Cleveland 13, Ohio.

PATTERN SHOP SUPERVISOR

Age 35, ten years' experience, now in charge of three man shop. Familiar with foundry, machine shop practice and casting design. Desire to relocate. Address: Box 442, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

PATTERN CHECKER OR WORKING FOREMAN

Years of experience in the medium to heavy pattern and casting industry. Steel and foundry background. Reference on request. Address: Box 468, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOREMAN — WOOD PATTERNMAKING OR PURCHASING PATTERNS AND CASTINGS, EXPEDITING AND COORDINATING.

Years of experience in the medium to heavy machine tool industry. Iron and steel foundry background. Address: Box 365, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY METALLURGIST

Twenty years' experience includes electric steel castings, high tensile bronzes, malleable, gray iron and magnesium castings. Developed better methods of melting and control of foundry molding materials. Published papers on quality control methods, foundry sands, and metallurgical topics, gates and risers. Address: Box 436, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

EXECUTIVE

Experienced in all phases of foundry operation and management with thorough knowledge of each shop process, engineering, metallurgy, cost estimating and accounting, sales ard industrial relations. Technical graduate. Excellent recommendations. Address: Box 488, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Positions Wanted

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Statistical and applied. Accurate defect analysis; effective corrective and preventive action. Process control. Three to six months' contract. Eastern U. S. preferred. Address: Box 454, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SITUATION WANTED

Cleaning room foreman and inspector. Fifteen years' experience in gray iron, twelve years experience in metal pattern work. Address: Box 459, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Representatives Wanted

MANUFACTURERS' REPRESENTATIVES

Well known manufacturer of foundry equipment needs established equipment-sales-representatives for EASTERN MICHIGAN — MINNEAPOLIS AND ST. PAUL — IOWA AND SOUTHERN ILLINOIS — SOUTH ATLANTIC STATES. Must be aggressive and have engineering background—to SELL Core and Mold Blowers and allied foundry equipment. In your reply, state experience, products now handled and territory covered.

BOX 477, FOUNDRY
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REPRESENTATIVES WANTED

America's fastest growing equipment builder has openings for representatives in the following territories: Ohio, Indiana, Kentucky, Southern California and the Northwest (Washington, Oregon, Idaho and Montana). If interested write for complete details enclosing brief resume of your qualifications.

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Agents now calling on foundries to sell patented lighting fixture designed for foundries. Exclusive. Attractive commission arrangement. No inventory. Excellent repeat business.

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A midwest custom machine tool manufacturer is expanding sales efforts into all industrial centers of U. S. and Canada. Michigan, Wisconsin and Chicago territories are now covered. Machine tool dealer or representative should know founding, process, and manufacturing engineering. All confidences respected. Full information, please.

BOX 465, FOUNDRY
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MALLEABLE CASTINGS SALESMAN

With malleable foundry background. We are desirous of securing a man with a following among buyers of malleable within a radius of 250 miles of Chicago. Please, state age and qualifications. Address: Box 453, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

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Salesman with industrial clientele, wanted on high commission. Write complete personal and sales data in confidence. Include photo. BRAM CHEMICAL CO., 820-65th AVE., PHILADELPHIA 26, PENNSYLVANIA.

Representatives Available

MANUFACTURERS' REPRESENTATIVE

Well acquainted in foundry and industrial fields, state of Wisconsin, desire additional lines. Interested in abrasive products; heavy equipment, etc. Address: Box 466, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

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Manufacturers' Agent, sales, or service, desire to handle foundry equipment or related lines. Engineering facilities and thorough knowledge of all foundry equipment, materials and methods. Address: Box 451, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Employment Service

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If you are looking for a particular man or a particular job, it will pay you to get in touch with me. I know your field, understand your problems, and, most of all, have the "know-how" required to bring the right man and the right job together.

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PATTERN ENGINEERING SERVICE

For all foundries who specialize in mass production of various castings. Complete and detailed layouts of all necessary pattern equipment to produce castings in mass quantity incorporating the utmost in engineered quality castings and economy in manufacture.

MASTER ENGINEERING SERVICE
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NEWAGO TWIN HOPPER GATED
TYPE HANDY SANDY,
MODEL HS-7-GT.

PEORIA MALLEABLE
CASTINGS CO.
PEORIA, ILLINOIS
PHONE 2-5401

WANTED

Used Simpson Portamuller, wired for 220/3/60. Write giving full details, price and where located.

BOX 415, FOUNDRY
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WANTED

Used Molding Machines—SPO #507 and #9546. State price and condition in first letter.

EAST JORDAN IRON WORKS, INC.
EAST JORDAN, MICHIGAN

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One 6-ton Bottom Pour Geared Ladle. 57 x 51 x 57.

CRUCIBLE STEEL CASTING COMPANY
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WANTED

Bushing patterns and core boxes. Send complete information. Address: Box 462, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Wanted-To-Buy

WANTED

OSBORN ROTO-LIFT
MOLDING MACHINE

MODEL NO. 3161

PEORIA MALLEABLE
CASTINGS CO.
PEORIA, ILLINOIS
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URGENTLY NEEDED!

Simpson Sand Muller, No. 1 or 1½, also require small muller Clearfield #404, B&P Mulbaro or Simpson Porto-Muller.
2—Newaygo Handy-Sandy, Twin Hopper Type
1—American Wheelabrator 15" x 20" or 20" x 24"
7—SPO 110 J Jolt Squeezers
1—Federal San-Bio, pulsating type.
Please include age, condition, serial numbers and lowest price.

BOX 489, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

MIXERS WANTED

Used Simpson Intensive Sand Mixers. State size, condition and lowest cash price or immediate acceptance. Address Box 578, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

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12 x 20 Fremont flasks and jackets, 4½ cope, 3½ drag, any degree taper. Address: KATON FOUNDRY, GRAND RAPIDS, OHIO.

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Gray iron foundry within 50 mile radius of Chicago. Replies confidential. Address: Box 476, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

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Going foundry in Monmouth County, New Jersey. Manufacturing own line of ornamental iron castings selling through electrical and gift shop dealers throughout country. Unlimited potential for enthusiastic sales-minded person. Address: Box 478, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

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Brass and aluminum foundry located in Northern Illinois. Earnings excellent. Will pay for itself in five years. Address: Box 482, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

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Well equipped brass and aluminum foundry in central Indiana. Would consider a partner. Address: Box 480, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

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ALABAMA OR TENNESSEE FOUNDRY

Manufacturer's agent with large following in automotive, stove and heater and agricultural industries wants connection with high volume Class 20 shop that can ship competitively into middle Indiana, Illinois and St. Louis area. Must have good core room and cleaning room. Shipments in truckload lots. Probable volume 75 to 100 tons monthly.

BOX 475, FOUNDRY
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Progressive Pacific Northwest Foundry and Machine Shop. With engineering and sales force, wants new lines for manufacture and sales. Address: Box 457, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

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Pattern shop for sale—to settle estate due to death of owner, old established wood and metal pattern shop, machinery and equipment, including seasoned pine and mahogany pattern lumber. Floor space can be leased. Immediate possession. Patternmakers available. For appointment write: MRS. ARTHUR SEWARD, SEWARD PATTERN WORKS, 501 WALBRIDGE ST., KALAMAZOO, MICHIGAN.

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FURNACES—BARGAIN

2000# Aluminum Fisher Tilting type.
2000# Aluminum Stroman Hydraulic Tilting type.
Dielectric Core Ovens—Model 900A and 1800A Conveyor type—1949; will set up in your shop.
Osborn Core Blowers—Models 91, 94, and 193.
Herman Jar Rollover & Pattern Draw; 1944; 48" x 144"; 10,000# Series.
Int'l. JDP Pattern Draw; 600# Cap. 8" draw.
Int'l. RES Jolt Squeeze Rollover Pattern Draw 35" table.
#275J Osborn Jolt Squeezers.
#601 Osborn Jolt Rollovers.
#2047-4 Osborn Power Rollovers.
Tabor Molding Machines, 30" x 40".
Champion Push Off machines; Model LLA-45 45" x 26" table.
#815 Johnston & Jennings Jolt Rollover Pattern Draw; 30" x 40" table; 15" draw.
#918 Johnston & Jennings Jolt Rollover-Clamp, Leveler, Pattern Draw; 44" x 54" table; 18" draw; automatic take-off—Excellent condition; no pit required—Save $5,000.00.
#2 Climax Wire Straightener.
1000 lb Air Hoists.

BALCHER MACHINERY COMPANY
6020 EUCLID AVENUE
CLEVELAND 3, OHIO
EX 1-8030

FOR SALE

American Wheelabrator Tablast #3 with 4-48" tables complete, controls, motors dust collector	$4000.00
Beardsley & Piper No. 40 Speedmuller	1200.00
Royer Sanditioner, portable, large size	160.00
8—SPO 110 jolt squeeze	225.00
25 Tabor molding machines, 10" squeeze	105.00
Adams molding machine, hand squeeze, 34"	75.00
25—Osborn molding machines, #2047-4 jolt rollover, table 18" x 24", 8½" draw, unused	300.00
Pangborn EN2 cabinet with dust collector, blower and motor	500.00
Coke Ovens, Gehnrich	175.00
150—Sterling flasks, 16" x 12", unused	3.50
Wheelabrator loaders, ship hoist	300.00
Whiting gear ladles, 2000 lbs	50.00
Riddles, Gyro	85.00
Electric portable grinders	25.00
American Dustube No. 185, capacity 16920 CFM with blower and motor	2000.00
Pangborn CD3 dust collector, 1695 CFM with blower and motor	350.00
American Dustube #35, complete	350.00
American Rotoclone, Type N., sludge type, 2500 CFM	750.00
Spencer Turbo pressure blower, 16 oz., 800 CFM, 5 HP motor	250.00
Hardness Testers, Magnaflux Inspection Machines, Sand Blasting Tanks.	

M. ELSTEIN
422-426 GRAND ST.
JERSEY CITY 2, NEW JERSEY

FOR SALE

One Ipsen Model TC-300-E automatic electric annealing furnace (36 kw) 100% forced convection, 1850° F. maximum operating temperature, 24' x 36" x 12" hearth, automatic transfer mechanism, two zone water jacketed cooling chamber. Complete with panel board and Ipsen Model 500 Endothermic generator for 8 kw, 220 volt, single phase, operation. This unit was purchased new late in 1954 and has seen only a few months of limited use. The original purchase price was $13,000. Address: BRILLION IRON WORKS, INC., BRILLION, WISCONSIN.

For Sale

FOR SALE
ALMOST NEW FOUNDRY EQUIPMENT

1—Pangborn Roto Blast Table—6' Dia. Dust Collector
1—300# capacity Whirlmix Facing Sand Mixer, Model #3.
1—Royer Sand Conditioner
1—Fox Swing Grinder, 3" x 20" wheel size, 15 HP motor.
1—Model MM7M Multiplex Core Sand Mixer
1 lot of Steel Flask with Hardened Pin Guides, Sizes 32 x 48, 38 x 44, 46 x 46 and 46 x 50.
1 lot of supplies including Core Paste, Graphite, Core Wash, Ferro Manganese, Ferro Silicon, etc.

MOUNTAIN STATE FABRICATING COMPANY
P.O. BOX 1231
CLARKSBURG, WEST VIRGINIA

FOR SALE

1—B & P Swingslinger with 2 ton B & P Plate feeder. Large supply of tips and liners
2—Bristol Recording Thermometers for core ovens, 40°-700° range; 24 hour dials; 20' thermocouple bulbs. 1—never used. 1—used 2 months
1—Jaeger Mobile Crane, solid rubber tires, 5 ton capacity, 18' telescopic boom.
1—105 cu. ft. Curtis air compressor with after cooler.

MEECH FOUNDRY, INC.
9906 MEECH AVENUE
CLEVELAND 5, OHIO
MICHIGAN 1-5550

FOR SALE

1—Tinius Olsen 100,000# Universal Compression Testing Machine
1—Magnaflux Demagnetizing Unit
Simpson Sand Mixers 18" dia. Laboratory #0, #1, #1½, #2, #3.
Miscellaneous: Screens, Pulverizers, Grinders, Conveyors—all types, Tyler Rotap Screens, etc.
OUR 38th YEAR

CONSOLIDATED PRODUCTS CO., INC.
66 BLOOMFIELD STREET
HOBOKEN, NEW JERSEY
HO 3-4425 N.Y. TEL. BA 7-0600

FOR SALE

MOLD CONVEYOR—Link-Belt Horizontal Plane "Car Type". 152'-3" centers terminating by 4'-6" radius bends at each end with automatic Link-Belt #PD 156 Vibrating Shake Out Screen. G. E. 5 HP Motor, 1800 RPM Type "K," Frame #254, TEFC enclosure, 440 V, 3 ph., 60 cy.
BLAST CLEANING BARREL—Pangborn #14 Type GK-2, converted to GK-5. Equipped with #14 Type "FN" Vertical Tilting Loader and #12 Style "C" abrasive reclaimer.

INDUSTRIAL SUPPLIES CO.
330 NORTH SEVENTH ST.
STEUBENVILLE, OHIO

FOR SALE

2 complete C. I. Hayes Melting Furnace Equipments with 6 large Globar Elements with total rating of 30 KW per furnace for operation on 220 volts, 60 cycle, on single or three phase current. Both furnaces designed for 2450° F operation with a maximum of 2600° F to be used with #16 or #18 crucibles. This equipment complete with voltage regulators, transformers, Brown Electronik Temp. Controllers, and G. E. time switches.
For further information write to:

AVEDIS ZILDJIAN CO.
39 FAYETTE ST.
NORTH QUINCY 71, MASS.

FOR SALE

1—4' x 8' sand blast cabinet and dust collector.
1—Moulders' Friend 50".
1—double end Standard Electric 2 speed grinder, 24" wheels.
1—stock core machine, motor and attachments.
Air grinders, chippers, air hoists, electric hoists.

SOMIL EQUIPMENT & SUPPLY CO
620½ MARQUETTE AVENUE
SO. MILWAUKEE, WISCONSIN
PHONE: BR 1-7060

FOR SALE

1—Model M 99/80 Sand Cutter
3—NC242 Royers—12"
1—Simpson Model 2 Muller, Style B, complete with speed reducer, skip loader, dusthood, motors, and starters.
RECONDITIONED

MID-CITY FOUNDRY COMPANY
1521 WEST BRUCE STREET
MILWAUKEE 4, WISCONSIN

FOR SALE

PANGBORN No. 33 Type LS BLAST CLEANING ROOM, 7'6" SQUARE AND 6'6" HIGH. ADDRESS: THE WELSBACH CORPORATION, 1500 WALNUT STREET, PHILADELPHIA 2, PA.

FOR SALE

MOLDING MACHINES
1—Herman, Jolt, Rollover Draw, 6000#, 40" x 60" table.
1—Herman, Jolt Stripper, 48" x 54" table.
2—International, Jolt, Rollover Draw, 24" x 10G, Stationary.
2—International, Jolt, Rollover Draw, 20" x 8-G, Portable.
1—SPO #305 Jolt Stripper.
2—No. 275 Osborn jolt squeezers
1—Tabor 36 x 50 table Air Jolt Rollover Draw, 3000# capacity.
2—SPO #611B stationary oscillating, jolt, squeeze strippers.

CORE OVENS
1—Coleman Recirculating 3 section with 5 drawers per section. Gas fired.
1—Coleman Recirculating 4 section with 5 drawers per section. Gas fired

BLOWERS FOR CUPOLAS AND FURNACES
1—Connersville Rotary Blower, 3500 CFM.
2—#7½ Roots rotary blowers—27 x 81—14000 CFM.
1—Connersville rotary blower 22 x 66 45 cu. ft. per revolution 9000 CFM.
Maxon-Premix Blowers for Gas ¼ to 1 HP.
2—5 HP 20-oz. Spencer Turbine Blowers.
2—2 HP 20-oz. Spencer Turbine Blowers.

METAL MELTING EQUIPMENT
1—1000# open flame brass melting furnace, gas fired.
1—550# Reda Furnace, nonferrous or iron—oil or gas.
1—Hausfeld Stationary Brass, oil or gas burner, 200# cap.
1—Hausfeld Tilting crucible, gas, 250# Al. Cap.
1—Hausfeld 2000# aluminum capacity furnace, barrel type, open flame, oil fired.

MISCELLANEOUS
1—Pangborn Rotoblast 14' dia. table with five 5' tables complete.
1—Pangborn 1 to 4 nozzle air blast generator, complete.
1—Sullivan, 2 stage compressor, 14-8¾ x 10, 75 HP.
1—20 HP U. S. Four Speed Snagging Grinder, 24" x 3" wheels.
1—Stoney crane type shakeout.
1—NC-4 Royer sand separator.
1—#1 Demmler core blower.
1—#16 Roto-clone unit complete.
1—36 x 48 tumbling mill.
1—30 x 48 tumbling mill.
Complete stock of rebuilt mill and dust exhaust blowers.

FOUNDRY SUPPLIES

DESCRIPTION	QUANTITY
Sohio Heat #2—10 Lg. Drums (53 gal ea)	990 Gal.
Ivory Sterric Acid Fl	221 Lbs.
Oilless Core Binder	30,515 Lbs.
Lion Core Binder	455 Lbs.
12" x 4" x ⅞" Chaplets	99 Ea.
⅜" x 12" Chaplets	17 Ea.
¾" x ⅛" x ¾" Chaplet Tinned #20	5,567 Ea.
1 x 1 x ½" Tin Perforated Chaplets	7 Lbs.
¾" x 1" x 1" Chaplets Perforated-Peerless	1,184 Ea.
¼ x 1 Super Chills Plain Finish	6.550 Ea.
⅜ x 1 Super Chills Plain Finish	4,000 Ea.
1½" Dia. x 1½" x 3" Coils #8 Gage Chills	1,300 Ea.
⅝" x 1½" Spiral x 1½" Tail Coils #12 Ga. Chills	2,500 Ea.
Pillsbury Dark Rye Flour	600 Lbs.
H & G Perforated Shim Gates 2 x 2"	391 Ea.
Glucose or Core Syrup	377 Lbs.
Glutrin	2 Drum
Paraspray	3 Gal.
1¼"—6 Point Hard Iron Milling Starwood	200 Lbs.
Thiemoid Chillcote	1 Gal.
Esso Carbon Core Wash	850 Lbs.
Esso Head Compound	2,000 Lbs.
Modern Blacking 1080-45	1 Bbl.
Prepared Doco Steel Core & Mold Wash	1 Drum
Olive Hill S.M. 9" 2 Arch	160 Ea.
High Grade S-602-4	558 Ea.
R-50A-49 Safe Tie Short Anchor Brick	7 Ea.
#1 Rockwood Silica Sand	
#10203 Charts F	600 Ea.
Carbon Steel Ladletherm	100 Lbs.
#3 Carbonite	500 Lbs.
#95 Laclede Christy Sleeve Tile	357 Ea.
#118 Laclede Christy Sleeve Tile	379 Ea.
#117 Laclede Christy Sleeve Tile	697 Ea.
No. MM-514 Laclede Christy Nozzles	395 Ea.
Sets Firm	7 Drum
P-7 Plug Mix	600-Lbs.
Thiemoid Santroll	5 Gal.
Ferro Carbo	2,850 Lbs.
Krome Kote	2 Drum
Electro Carb Brizuetts	14,790 Lbs.
Stopper Heads	348 Ea.
Glucose or Cre Syrup	377 Lbs.
1 lot of Runner Tile 4 x 9	
Ferro Chrome .03% Carbon	3018 lbs.
Calcium Manganese Silicon	979 Lbs.
Low Carbon Ferro Manganese	535 Lbs.
Calcium Molybdate	114 Lbs.

CLIFTON MACHINERY COMPANY
1023 W. SIXTH ST. CINCINNATI 3, OHIO

For Sale

FOR SALE
TURBO BLOWERS WITH MOTORS

CFM	PRESS.	MAKE	CFM	PRESS.	MAKE
6000	32 oz.	Ing.-Rand	500	10 oz.	No.Am.
4700	32 oz.	Ing.-Rand	340	20 oz.	A-B
4050	16 oz.	No. Am.	320	12 oz.	Spencer
2700	16 oz.	Spencer	9000	6" SP	Northern
2500	7 oz.	Sturt.	5310	10" SP	N.Y.
2000	16 oz.	Spencer	3420	8" SP	N.Y.
1150	20 oz.	No.Am.	2500	½" SP	American
800	13 oz.	Buffalo	2344	2" SP	Clarage
660	20 oz.	A-B	1100	4½" SP	Bayley
525	48 oz.	Ing.-Rand			

THE MOTOR REPAIR & MFG. CO.
1552 HAMILTON AVE.
CLEVELAND 14, OHIO

FOR SALE
DETROIT ELECTRIC FURNACE

Type AA of 1,200 lb cold metal or 2,600 lb hot metal capacity, complete with mechanical and electrical equipment for melting and rocking, including oil filled transformer of 11,000 v. primary and 125 v. secondary. Presently crated but available for inspection on 48 hours notice. Ideal for high test cast irons, brasses or bronzes. Price: $9,500.00. Address: HOPE ELECTRICAL PRODUCTS CO., 338 WILSON AVENUE, NEWARK 5, N. J.

FOR SALE

Pangborn Roto Blast, 9' LG-14 cleaning table. New 1952, used during one army contract. Sacrifice price $7500.00 FOB yard Philadelphia. Address: CONTRACTORS INTERNATIONAL SUPPLY CORPORATION, 521 FIFTH AVE., NEW YORK CITY, MURRAY HILL 2-2753.

FURNACES FOR SALE

Ten used heat treating furnaces and two 7-ton gantry cranes. Good condition, priced to sell. Address: BAER STEEL PRODUCTS, INC., BOX 1428, BOISE, IDAHO.

2 PANGBORN ROTOBLASTS

1 Model 14GK5 and 1 Model GK2. Also 198 ft. G.D. air compressor. Address: STANHOPE, 60 E. 42nd ST., NEW YORK 17, NEW YORK.

For Sale

CUPOLA

Morris Steel Products Company Cupola, 90" I.D. shell, 40' from bottom of crucible to top of stack, equipped with vertical skip hoist charging unit, with 3000# charging bucket, electric hoist and magnetic brake, mixing ladle 5' length x 4' dia. Complete with Ingersoll-Rand type FS-564-13000 CFM, driven by 150 HP 440 V, 3 Ph., 60 Cy. motor. THIS CUPOLA WAS NEVER USED, NEVER HAVING BEEN ERECTED. ORIGINALLY BUILT IN 1948.

INDUSTRIAL SUPPLIES COMPANY
324 NORTH SEVENTH STREET
STEUBENVILLE, OHIO

BUY—SELL—TRADE

Vapor Blast Machine .....$ 800.00
15" Continuous Wheelabrator Tum Blast (Like New) $4,500.00
27 x 36 Wheelabrator Tum Blast (Steel Belt) 2,500.00
48 x 42 Wheelabrator Tum Blast 2,500.00
#2 Wheelabrator Table 8' Diameter, 8-28" Tables 3,500.00
Pangborn 6' Multi Table (Good Condition) 3,000.00
Pangborn ES-421 Shell Blasting Machine (Like New) 3,500.00
Hand Sandblasting Cabinets (Like New)
Dust Collectors (All Sizes)
ALSO
Pressure Tanks, elevators, blowers, motors, all types and sizes.

DIAMOND SAND BLAST INC.
5654 W. JEFFERSON AVENUE
DETROIT 9, MICHIGAN
PHONE VINEWOOD 3-6750

FOR SALE

1—One way Moulders' Friend Sand Conditioner with extra brush. Ideal for small foundries. $1,000.00

SHEBOYGAN CASTINGS CORP.
SHEBOYGAN, WISCONSIN
PHONE: 3442

For Sale

FOR SALE
OSBORN MOLDING MACHINES

4—275J	Jolt Squeeze molding Machines	$225.00 ea.
1—559	Jolt Stripper Portable	750.00
1—559HD	Jolt Stripper Stationary..	750.00
1—561	Jolt Stripper	3250.00
1—714PJ	Jolt Squeeze Stripper	1500.00
5—720	Jolt Squeeze Strippers	1500.00 ea.
1—721	Jolt Squeeze Stripper	1600.00
2—814P	Jolt Squeeze Strippers	1250.00 ea.
4—601	Jolt Rollover & Pattern Draw	450.00 ea.
2—602	Jolt Rollover & Pattern Draw	600.00 ea.
6—2047-4	Jolt Rollover & Pattern Draw	650.00 ea.
2—405-95	Jolt Rollover & Pattern Draw	4500.00 ea.

THE MASTER FOUNDRY CO., INC.
15019 SARANAC RD.
CLEVELAND 10, OHIO

FOR SALE

2—Used Perkins belt-driven, 10½" throat sprue cutters

1—Used No. 2 Bridgeport belt-driven, floor type, ball bearing grinder with counter shaft.
1—Used No. 91 Osborn Core Blower.

THE IMPERIAL BRASS MFG. CO.
1200 WEST HARRISON STREET
CHICAGO 7, ILLINOIS

FOR SALE

DESULPHURIZER—"SULTRON"

Approximately 35 tons in 100 lb. bags.
Price: $30.00 per ton, F.O.B. Landisville, Pa.

BRUBAKER MFG. CO., INC.
LANDISVILLE, PA.

FOR SALE

2—#4 W. W. Sly Tilted Blast Mills complete with gear head motors and in good condition. Used 4 years. Address: Box 474, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

America's Largest Stock of Electric Melting Furnaces!

1—1500 KVA G. E. Transformer with taps for 11,000 or 13,800 volts.

Lectromelt 1 ton Side Charge with 800 KVA, 12,000 V transformer. Late type unit. Complete. Now in our Chicago warehouse.

1—Whiting Hydro Arc 8 MT Top Charge, 5600# per hour rate of melt, 8900# capacity of well, 8" electrodes. Furnace new 1952. 2000 KVA transformer, 12,000 volts. Complete with American Air Filter, smoke hood and Whiting Bag Type Dust and Smoke Suppressor. May be seen in place Chicago.

1—Chicago 3000# Electric Furnace, tilt back head. 4" electrodes, 800 KVA, 12,000 V transformer. Complete. May be seen in place Chicago.

1—Swindell Type 6 ton 9' diameter Shell Electric Furnace, 2500 KVA transformer, 13,800 or 11,000 V. In our Chicago warehouse.

Lectromelt 500# Side Charge Type T, 300-375 KVA transformer, 2300 V primary, Moore controls, G. E. circuit breaker. Late type. Now in our Chicago warehouse.

Transformers—2—2500 KVA furnace transformers, 11,000 or 13,800 primary voltage.

1—Detroit Electric, 1500# capacity, 13,200 primary voltage. Kuhlman transformers. Complete with controls.

Detroit Electric 350#, Type LFA with Kuhlman transformers and oil circuit breaker, 13,200 primary voltage.

Detroit Electric with 350# and 1000# tapered shells, 2300 V Kuhlman Transformer. Complete with panelboard and bus bars.

ACME EQUIPMENT CO., INC. 126 South Clinton Street, Chicago 6, Illinois
Phone: ANdover 3-3430

FOUNDRY BUILDINGS

This was a high production foundry with a daily capacity of 750 tons. Much of this was installed 1950 or later. Now this late type equipment must be sold.

AIR COMPRESSORS
Chicago Pneumatic Simplate type OCTDE, 3600 CFM and 1200 CFM, 24″ and 14″ x 18″, 2 stage horiz. tandem duplex 4 cycl. double acting.
Ingersoll-Rand Imperial type 10-1200 CFM.
Ingersoll-Rand Imperial Type 10-800 CFM.

AUTOMATIC CORE BLOWERS
Osborn Rotocore automatic, with hopper and belt conveyor.

BATCH TYPE CORE OVENS
3—Double compartment, 7′ x 7′ x 15′ ea. compartment, combination oil or gas fired.

BLOWERS AND FANS
100 fans and man coolers, stationary and wall mount types, ½ to 5 H.P.

CLEANING ROOM
2—Pangborn continuous shot blast, cylinder block or similar work. Cabinet 17′ long, 9′6″ high, 7′6″ wide.
Vestibules 7′6″ wide, 6″ long, 9′6″ high.
3—American Wheelabrators, model K blast cabinet.

COOLING TOWER
4600′ Jervis B. Webb 678 chain with 4 drives. System picks up castings at shakeout stations, takes it through outdoor tower, 20′ wide, 123′ long, 43′ high. Will sell all or part.

CORE DRAW MACHINES
20—SPO CD 36 or Ferro.

CORE CONVEYORS
6—Flat belt 24′ to 95′ long, 32″ high, complete with drives.
Hundreds of feet with Jervis B. Webb 458 chain.

CAR TYPE MOLD CONVEYORS
Jeffrey 90 cars long, 452′ of track.
Bartlett-Snow 300′ long, 72 cars.
Link Belt, 490′ long, 107 cars.

CONVEYORS
10,000 ft. roller conveyor 8″ to 24″ heavy duty.

FLAT BELT CONVEYORS
41—14″ to 36″ widths, 12 to 164′ long, send for list.

CORE BLOWERS
10—Osborn 193, for horiz. parted boxes.
10—Osborn 93, cap. up to 50 lb. cores.
6—International SB 13 and SB 17.
6—Redford bench type with steel tables.

CORE GRINDERS
5—Milwaukee #70, 70″ dia. table, 30″ wheels.
18—Stoney, 12″ to 18″ heads with 60″ long tables.

CUPOLA BLOWERS
Roots-Connersville 22″ x 66″ cupola blower, serial 21105, 32 oz. 40 CFM per revolution. New May 1954, cost $7,425.00.
Roots-Connersville, 22″ x 66″, 28 oz. New 1949.
G.E., Ingersoll, Spencer, all 24 oz.

CUPOLA CHARGER SYSTEM
2—Shepard Niles 3 ton cupola charging cranes, class b.c. form 24 ch. Enclosed cab. 37′6″ lift. 400′ 15″ I beam track.
4—Lifting magnets. 55″.

FURNACES ALUMINUM
Stroman 1000 lb. double well barrel type tilting aluminum melting furnace. Oil or gas fired. New 1954.
Stroman 2000 lb. Same as above. New 1954.
Electromelt, 2000 lb. cap., 6″ electrodes, 800 KVA, 11000 volt transformer.

SWING FRAME GRINDERS
15—U. S. 16″ to 24″ wheels.
10—U. S. double end snag grinders, up to 24″ wheel sizes.

FLASK GRINDER
Gardner 179—with 8B Roto Clone.

GSOLD EVERYTHING MUST BE SOLD AND REMOVED FROM THE PREMISES.

HOISTS AND CRANES
Cleveland Monorail hoists, 2000 and 3000#.
Yale Electric, 500 and 1000# with chain buckets.
Peerless Chain, 1000, 2000 and 3000#.
Cleveland Bridge Crane, 6′ to 20′ wide.

HOISTS
Cleveland and Yale Electric, Ingersoll-Rand, Curtis Air and Peerless Chain hoists.

HOT METAL CARRIER SYSTEM
(will sell all or part) 6—Cleveland Electric carriers with one ton electric hoists and open cabs. 2 motor drives single speed hoist, 3 HP DC 230V motor with 360′ Cleveland tramrail on I beam stringers double conductor bar and switches. This unit cost over $60,000 with installation costs.

LADLES
Geared crane ladles, 22″ x 22″.

MATERIAL HANDLING
24 ton American Diesel Locomotive crane, 55′ boom, for magnetic and bucket work. New May 1951.
Brownhoist 1B-200 clamshell bucket.
Lessman Loader.
12—Ford tractors.
Trojan loader, LA40-B402, 1000 lb. lift and 12′ bucket. New 1953.

MOLDING MACHINES (JOLT SQUEEZE PIN LIFTS)
9—Osborn 712 PJH; 2 Osborn 724 PJ; 6 Osborn 726; 2 Osborn 726 PJA with Hydra Motors; 7 International PK 20; 6 International PKL-12-5.

MOLTRUP STEEL CORE PLATES
6″ x 32″ up to 25″ x 25″.

MULLERS
B & P #60 Muller with skip loader.
6—LINK BELT pug mill type.

PATTERN SHOP
Benches, vises, surface plates, layout tables, Oliver wood lathe.

ROLLOVERS
2—SPO 508, jolt rollover. 28″ x 30″ table, 9″ draw.
International type REDP power rollover, 9″ draw: type REDD hand rollover, 8″ draw.
Also coremakers rollovers from 14″ x 14″ to 30″ x 30″ tables.

ROTOCLONES
16—American Air Filter Co., sizes 8-16-24 and 27, both wet sludge ejector and dry types.

SCRAP YARD CRANEWAY & CRANES
71′ wide, 249′ long, 43′ high, open steel frame construction. Roof members are in place, only a skin is needed to make it a building. With 2 Shepard Niles 5 ton 3 motor 230V D.C. Electric traveling bridge cranes.

SHAKEOUTS
6—Like Belt 4 x 8.
8—Simplicity 3 x 8 and 4 x 8.
3—Stoney core knockouts, stationary types.

STEEL FLASKS
Mostly BS and B and Sterling.
From 14″ x 14″ to 36″ x 36″.
Write for list.

TOWER CORE OVENS
4—Coleman, 45′9″ high 2,000,000 B.T.U. with combination oil or gas burners, 26—3 shelf carriers, 24″ x 90″ shelf size.
1—Coleman, 36′ high combination oil or gas burners, 36—3 shelf carriers 24″ x 90″.
2—Coleman, Combination oil or gas burners, 43 trays 24″ x 90″.
1—Coleman, Combination oil or gas burners, 43 carriers, 30″ high, 30″ x 144″ shelves.

WRITE **WIRE** **PHONE**

FERRO MACHINE AND FOUNDRY COMPANY

3155 EAST 66TH STREET • DIAMOND 1-7170 • CLEVELAND, OHIO

FOR SALE

AIR COMPRESSORS

Ingersoll Rand Type 10—14 x 9 x 12, 2 stage, 75 HP, 3/60/220/1200 rpm synchronous motor, 350 CFM at 100#.

5 x 5 Ingersoll Rand 10 HP motor.

Ingersoll Rand Type 10, 800 CFM, XRB2, 16" stroke 20" x 12½" cylinder, 2 stage compressor, 206 HP, 220 volt motor, with starter and air receiver. Complete. This unit was rebuilt in 1952 by Earl Knox Co.

Ingersoll Rand Type 10, 800 CFM, 2 stage air compressor, 200 HP, 220 V motor. This is an older unit. No starter or air receiver. Overhauled in 1951.

Sullivan Vertical Single Stage 100 HP air compressor, 220 volt motor, with starter and air receiver.

BLOWERS

Spencer Turbo Blower, 2250 CFM at 16 oz. 15 HP 3/60/220 totally enclosed motor. New 1947.

Ingersoll Rand Motor Blower Type FS. Single Stage 4000 CFM @ 3.75 PSI. 100HP, 220 V. G.E. Induction Motor.

Buffalo 7E Direct Connected Blower, 50 HP Westinghouse motor, 3/60/220-440 V, 3535 rpm, 28" wheel. 3500-4000 CFM at 32 oz. Flanged outlet.

General Electric 7500 CFM, 20 oz., 89.6 Max HP, 220 V motor. Airway controls.

CONVERTER

100 KW Rotary Westinghouse 220 V 60 cycle primary 250 V DC, complete with controller and panel.

CORE BLOWERS

International SB 13.
Federal Sandblo CB40B, like new.
Demmler #50.
Peterson Core Blower (Similar to Demmler #50).

CRANE LADLES, GEARED

1—42" x 47" Grane Ladle.
2—44" x 44" Crane Ladles.

CRANES

5 Ton P & H Overhead Elec. Traveling Crane 30'6" span, 15' lift (can be increased) 3 motor, 220 V A.C. New 1946.

CRUSHERS—PULVERIZERS

1—Stedman 15" x 12" Type A. With 10 HP 220-440 V motor.

DUST COLLECTORS

Whiting Dust Suppressor, bag type, 12,000 CFM, 30 HP motor to handle hot fumes from electric furnace hood. New 1953. Cost us over $14,000 before erection and without wiring or duct work.

GRINDERS, DISC

Besley 208 Double End 26" x 2⅝" wheel with 2 compound tables, V belt drive, 15 HP, 220-440 totally enclosed motor magnetic starter controls.

2—U. S. Model 80 Double End 2-18" dia. wheels, 7½ HP motor, 2 swinging tables 8" x 14"—1 with hand lever feed.

GRINDERS, SNAGGING

McCabe 2" x 24" wheels, 48" between wheels, 3/60/440 V.

1—Hammond type 20 WR2—3" x 24" wheel, double end grinder, single speed, 20 HP Louis Allis Squirrel Cage, 220-440 V—1760 rpm motor.

1—U. S. DE, Model 65, 3" x 24" wheels, variable speed, 20 HP motor.

Kling Bros. 30" Double End Snag Grinder, heavy duty, 15 HP motor.

Kling Bros. 18" Double End Snag Grinder, heavy duty.

GRINDERS, SWING

2—Fox 10 HP 3/60/220-440 V, Swing Frame.
U. S. 15 HP, 3/60/440 V Swing Frame, 2 speed.
Fox 15 HP Swing Frame, 2 speed.
Marschke 20 HP, 2 speed.

HOISTS

1000# Cleveland 220/440 V.
1000# Detroit 220/440 V.
5—1000# P & H Hevi Duty with trolley.
11—4000# P & H Hevi Duty with trolley.
2—4000# P & H Hevi Duty with trolley and powered drive unit for moving hot metal.

LADLES

1 Ton Enclosed Gear Crane Ladle truck type 4 wheel car for 18" gage track, Whiting Junior.

MOLDING MACHINES

1—Johnston & Jennings 1015 Jolt Pin Lift, 30" x 38" table.

1—Champion Hand ram, hand clamp, hand rollover 26" x 14" table.

1—Champion Hand Ram, Hand rollover, Hand draw core machines, 15 x 15 bed.

3—Davenport Portable Jolt Rollover Pattern Draw 20" x 24" tables, open end, 8" draw.

1—International Type G 24 x 10 Jolt Rollover foot draw, 22" x 30" table, 10" draw.

1—Herman Molding Machine Jolt Rollover Pattern Draw, 20 x 30.

1—Herman Molding Machine Jolt Rollover Pattern Draw, 20 x 36.

1—International Type G 30 x 12 Jolt Rollover Foot Draw, 28" x 36" table, 12" draw.

1—International Type G 30" x 30" table, 9" draw, Portable.

2—International Type G 18" x 56" table, 8" draw. Portable.

1—International Type F Jolt Rollover 27 x 12, 12" draw, 35" x 26" table.

1—International Jolt Rollover Pattern 10" Draw, 22" x 30" plate, 6" jolt cylinder.

1—International Plain Jolt Molding Machine 48" x 60" table, no pit required.

1—Herman Jolt Rollover Pattern draw, 40" x 84" table, slotted nickel alloy table over regular table to accommodate various sized flasks, air clamp, new 1946. Used very little.

1—Herman 20" x 30" rollover pattern draw, 750# series. Air clamp.

2—Herman 20" x 24" Jolt Rollover Pattern Draw, 750# series. Air clamp.

1—Herman 4000# Series High Speed Rollover 30" x 60" with 32" x 48" bumper, 13" cylinder pattern device.

2—Milwaukee Arm Type Jolt Squeeze Strippers, 1500# capacity, Model 163-50 Serial 13104-5, 15" x 24" table, 16" x open end, pattern size. Late type.

1—Osborn 76J Portable Jolt Squeeze Molding Machine 12" cylinder.

2—Osborn 405 Jolt Rollover 40" x 70", 2000# capacity, 20" x 60" jolt table and 4 wheel receiving car.

1—Tabor 1000# Rollover, 30" x 60" table.

4—Spo 214 Jolt Squeeze Pin Lifts.

Milwaukee 2542 Jolt Stripper, 38" x 42" table. Serial 14805.

MULLERS AND MIXERS

Simpson #2 Motor on base.
Simpson #3 Motor on base.
Simpson #3 Type H open gear type.
Simpson #3 Open Gear Type $1000.00.
Simpson #3 Muller with bucket loader.
American Model M Sand Cutter, 70" blades.
Royer NDP 47 14" Belt, 4 rubber tires.
B & P Speedmuller 80 w/cooling blower.

PREPARATOR

B & P #70 Preparator. Only used 3 months.

RIDDLES

Champion Sand Riddle, floor type.
Universal Sand Riddle.

ROTOBLAST

Pangborn, table with 3-8" rotating work tables, 3 position loading, cleaning and touch-up designed for work similar in size to aircraft cylinders. Like New condition.

SAND HANDLING EQUIPMENT

Blaw Knox Sand Grab Bucket for crane use.

SHAKEOUTS

2—4' x 6' Simplicity.
1—4' x 6' Simplicity, 15,000# capacity.

SPEED REDUCERS

We have a large stock of speed reducers and geared head motors. Write us your needs.

WHEELABRATORS

1—American Wheelabrator 48" x 48" with loader, 220/440 V motors.
1—American Wheelabrator 36" x 42" with loader, 220/440 V motors.

FLASKS

Hines Popoff and Jackets

1st Figure is Depth of Cope

2nd Depth of Drag

1—10" x 17" flask 4/3
1—10" x 18" flask 5/4
1—11" x 16" flask 5/4 1/2
1—11" x 22" flask 5/4
1—12" x 12" flask 5/3 1/2
1—12" x 16" flask 5/7
2—12" x 16" flasks 6/5
1—12" x 16" flask 7/5
1—12" x 16" flask 7/7
1—12" x 16" Extra 4½" drag
13—12" x 16" C.I. Jackets
1—12" x 18" flask 5/4
2—12" x 18" flasks 6/6
1—12" x 18" flask 7/7
1—12" x 18" extra drag 5"
1—12" x 18" extra drag 7"
11—12" x 18" C.I. Jackets
1—12" x 20" flask 5/5
1—12" x 20" flask 5/7
2—12" x 20" flasks 7/5
1—12" x 20" extra 5" drag
8—12" x 20" C.I. Jackets
2—12" x 22" flasks 5/5
8—12" x 22" C.I. Jackets
1—12" x 26" flask 5/5
11—12" x 26" C.I. Jackets
1—12" x 30" flask 5/5
11—12" x 30" C.I. Jackets
1—14" x 28" flask 6/6
1—15" x 18" flask 5/3 1/2
1—16" x 21" flask 6/5
1—17" x 17" flask 6/5
1—18" x 26" flask 5/5
8—18" x 26" C.I. Jackets
1—19" x 19" flask 5/4
2—20" x 20" flasks 6/6
7—20" x 20" C.I. Jackets
2—24" x 24" flask 8/8
1—24" x 24" 3" drag upset
1—24" x 24" extra 6" cope upset
8—24" x 24" C.I. Jackets
1—24" x 28" flask 6/6 1/2
2—34" x 34" flasks
10—34" x 34" C.I. Jackets

ACME EQUIPMENT CO., INC.

WE WILL BUY FOR CASH A SINGLE PIECE OF EQUIPMENT OR YOUR ENTIRE FOUNDRY

126 South Clinton Street Phone: Andover 3-3430 Chicago 6, Illinois

FOR SALE

AIR COMPRESSORS
1—150 H.P. 800 CFM Ingersoll-Rand two-stage 230V. 3 ph. 60 cy. with air receiving tank.
1—20 H.P. 110 CFM G-E two stage, 250 V. D.C.

AIR HOISTS
1—6 ton Detroit Pneumatic with trolley.
3—3-ton I-R, Thor, C-P.
12—Pendant Curtis Class G 1 to 3 ton.
8—Pendant Hanna 5" x 36" cyl.

CONVEYORS
5—Bucket elevators.
2—11" belt x 33'6" and 37' centers.
1—14" belt x 51' centers.
2—20" belt x 48'6" and 56' centers.
1—Bucket elevator for coke 80' centers, double strand chain and continuous buckets.
1—Sorting conveyor, 44' centers, 30" wide steel plates, L-B chain.
18—Sand handling conveyors.
2—18" belt x 38' and 155' centers.
1—20" belt x 122' centers.
12—24" belt x 25'6", 29'6", 40'6", 45', 69', 93'93'93', 93'93'106', and 118' centers.
2—30" belt x 33' and 42'6" centers.
1—36" belt x 30'.
3—Steel Apron Conveyors.
2—30" wide x 15' and 57' centers.
1—21" wide x 5'6" centers.
Roller Conveyor—8", 10", 30", and 36".
1—Link-Belt Roller Type Power Mold Conveyor, 27' x 70'6" centers, 35 cars 38" x 72", 45 ft. per min. with frame work, take-ups, idler corners, driving mechanism, speed reducer, motor and controls.
1—Pigmold conveyor 64' sprocket centers, Link-Belt complete with drive 220/440/3/60.

CORE BLOWERS
DEMMLER
2—#50 weight of core up to 6 lbs.
2—#2 weight of core up to 25 lbs.
1—#2K weight of core up to 25 lbs.
1—#3 weight of core up to 35 lbs.
1—#3E weight of core up to 35 lbs.
OSBORN
9—#92 weight of core up to 35 lbs.
1—#194-1 weight of core up to 100 lbs.

CRANES
1—3 ton—3 motor Bedford bridge crane, 40' span, double built up steel bridge with catwalk man cab, drum controls, roller collectors, 30 H.P. Hoist motor, 10 H.P. travel motor, 3 H.P. trolley motor, 220/440/3/60.
2—12' Cleveland hand traveling bridge cranes.
2—3 ton Shepard Cupola Charging Cranes, DC 550V. cab operated, with monorail.
Gib cranes ¼ to 2 tons.

FURNACES AND BLOWERS
FURNACES
STROMAN
2—200/225 NP hydraulic tilt with blowers.
CAMPBELL-HAUSFELD
2—2000# IPNT electric tilting, 2 burners.
BELLEVUE
4—#200 with oil burner, hand tilting.
FISHER
1—#500 MNP Nose Pour, electric tilting.
2—#1000 Rotary hand tilting, oil burners.
ELECTRIC
1—6000 lbs. Heroult-Lectromelt, 3000 KVA 13200 primary volts, 239-85 secondary volts, Delta Y with taps, 3 phase 60 cycles, complete controls.
HEAT TREATING
1—G. E. 30" x 42" 1800° 37 KW 220V. 1 ph. 168 amps.
ANNEALING
1—Bellevue Combination Oil & Gas with controls.

FURNACE BLOWERS
3—3 H.P. 300 CFM 16 oz. 220/440/3/60.
3—7½ H.P. 975 CFM 16 oz. 220/440/3/60.
1—15 H.P. 2100 CFM 16 oz. 220/440/3/60.

CUPOLA BLOWERS
1—Spencer Turbine, 50 H.P., 6750 CFM, 16 oz., 220/440/3/60.
1—North-American, 20 H.P., 1950 CFM, 20 oz., 220/440/3/60.
1—Piqua Size 5½, 6000 CFM, 16 oz., 220/3/60, 30 H.P.

EXHAUSTERS
1—Sturtevant Silentvane, Size 75, 5 H.P., 220/440/3/60.
1—Sturtevant, Size 6, Type CS, 10 H.P., 220/3/60.

GRINDING EQUIPMENT
2—Fin Cleaning Machines for cylinder heads —Ireland.
1—#230 Gardner double end disc, 30" wheels, V-belt.
3—5 H.P. Safety Emery Wheel Co., 18" x 3" wheels, 220/440/3/60.
1—10 H.P. Black & Decker dble. end 20" x 3" wheels, 220/440/3/60.
1—15 H.P. U. S. Electric double end, Model 65 double end, 4 speeds.
1—7½ H.P. Universal Swing Grinder, 220/440/3/60.
3—20 H.P. Marshke Swing Grinders, 440/3/60.
1—#24 Gardner Horizontal disc grinder, 54" diameter, 20 H.P., 220/440/3/60.
1—#19 Besly Horizontal disc grinder, 52" diameter, 15 H.P., 220/3/60.

LADLES
MODERN & WHITING
15" to 27½" diameter, 250 lbs. to 2000 lbs. capacity with Modern type FA Pouring devices.
2 ton and 3 ton Teapot spout, E-Z Pour enclosed gearing.
2—6000 lbs. Modern Mixing ladles.

MOLDING MACHINES
JOLT ROLLOVER AND PATTERN DRAW
DAVENPORT
2—SA-28, 1500 lbs. jolt, 12" draw, 30" x 40" table, air clamps.
2—SA-34, 2500 lbs. jolt, 15" draw, 34' x 48" table, air clamps.
1—SA-40, 3000 lb. jolt, 18" draw, 40" x 60" table.
HERMAN
1—3000 lb jolt, 40" x 50" table, air clamps.
1—6000 lbs. jolt, 42" x 60" table, air clamps, pit type.
JOHNSTON & JENNINGS
1—918, 18" draw, 2000 lbs. jolt, 44" x 54" table.
OSBORN
2—405-95, 26" draw, 3500 lbs. jolt, 40" x 60" table.
2—602, 36" flask, 600 lbs. jolt.
6—601-13, 10" draw, 900 lbs. jolt.
8—2047-4, 8" draw, air clamps.
1—422 with swing out table.
SPO
1—9336, 9½" draw, 800 lbs. jolt, 22" x 28" table.
TABOR
2—22" x 32" table, 10" draw, 600 lbs. jolt, air clamps.
1—24" x 42" table, 10" draw, 600 lbs. jolt, air clamps. Never used.
JOLT SQUEEZE PIN LIFT
INTERNATIONAL
1—LJSK Hand lever pin lift, 6" draw, 18" x 24" table.
MILWAUKEE
1—145-1, 8" draw, 1700 lbs. jolt, 25" x 30" table, 14" squeeze cyl.
4—4" draw, 11" squeeze cyl., 17" x 21" table.
OSBORN
2—814-P Stationary, 8" draw, 700 lbs. jolt, 14" squeeze cyl.
1—714PJ Stationary, 7" draw, 20" x 31" table, 14" squeeze cyl.
5—720 Stationary.
1—721 Stationary.
JOLT SQUEEZERS
HAYNES
INTERNATIONAL LJS
MILWAUKEE 124-6, 103
MODERN
OSBORN 275J, 210PJ
SPO 113P
TABOR

JOLT STRIPPERS
INTERNATIONAL
1—JFL Foot lever lift, 3" draw, 600 lbs. jolt, portable.
3—LP-6, 8" draw, 1000 lbs. capacity, Pins adj. 16" to 24".
JOHNSTON & JENNINGS
1—68SP, 8" draw, 600 lbs. jolt, 25" x 30" table, portable.
OSBORN
1—559, 6" draw, 1200 lbs. jolt, 25" x 30" table.
1—559-HD, 6" draw, 1200 lbs. jolt, 25" x 30" table, portable.
1—561-41, 12" draw, 5000 lbs. jolt, 40" x 50" table, pit type.
HERMAN
2—40" x 60" table, 6000 lbs. jolt.
1—36" x 36" table, 3000 lbs. jolt.

ROCKOVER AND DRAW
INTERNATIONAL
4—"R" hand ram, hand rollover, 8" and 10" draw.
3—"RJ" power jolt, hand rollover, 8" draw, 14" x 20" table.
MODERN
2—2-38 hand ram, hand rollover, hand draw.
OSBORN
1—147-1, 20" x 60" core box max.
1—146, 24" x 32" core box max.
PRIDMORE
2—hand ram, power rollover.
SPO
1—506, 24" x 25" table, 600 lbs. jolt, 10" draw, stationary.
CHAMPION
2—Type W 22" hand rollover, 12" draw.
1—Type W 16" hand rollover, 8" draw.
PUSHOFF
2—size 38" x 40" Champion, 10" draw.
1—Osborn 3' x 16' table.
PLAIN JOLT
1—Osborn No. 98, 220 lbs. jolt, 12" x 12" table.
1—Tabor Model B-4, 700 lbs. jolt, 18" x 24" table.
1—Tabor Model B-6, 1300 lbs. jolt, 36" x 36" table.
2—International, Type J, 1300 lbs. jolt, 31" x 44" table.
1—International, Type J, 3000 lbs. jolt, 36" x 48" table.
1—International, Type J, 10,000 lbs. jolt, 76" x 76" table.
SHELL MOLDING MACHINE
1—Shalco, Model CO-1, ser. #79, new condition.

SCALES
TOLEDO
1—6500 lbs. dial floor scale, 5' x 7' platform.
FAIRBANKS-MORSE
2—Printomatic dial scales.
1—Core Sand scale with hopper.

SAWTABLE
TABOR
1—Abrasive cutoff, 10 H.P., 220/440/3/60.

SAND SLINGERS
1—Motive Junior Beardsley-Piper, 19" head, 4" tip, 220/3/60.

SHAKE-OUTS
ROBBINS
1—4' x 10', 12,000 lbs. capacity with 7½ H.P., 220/440/3/60 "Floatex".
SIMPLICITY
1—4' x 6', Model D, 16,000 lbs. capacity, 10 H.P., 220/440/3/60.
MIDWEST
1—120' x 36" Apron shakeout conveyor.

SAND MULLERS
SIMPSON
2—#2 Model H, Type E with skip bucket, 220/440/3/60, 20 H.P., 14 cu. ft.
1—#3 Model H, Type E, 220/440/3/60, 60 H.P., 30 cu. ft.
3—#3 Model C, Type E, 220/440/3/60, 60 H.P., 30 cu. ft.
BEARDSLEY-PIPER
2—#70, 29-58 tons per hour, 18 cu. ft. per batch, 100 H.P., 220/440/3/60.
1—#30, 6½-13 tons per hour, 4 cu. ft. per batch, 20 H.P., 220/440/3/60.
LINK-BELT
1—Paddle type, 20" x 72".
1—Pugmill, 42" x 96".
BLYSTONE
1—#2A—5 cu. ft., 3 H.P., 220/440/3/60.

SAND CONDITIONERS
ROYERS
2—C-2, 10 to 15 tons per hour, 1½ H.P., 1750 RPM motor.
LINK-BELT
1—Aerator with drive and motor.
RAPP
1—No. 27 Revivifier.
AMERICAN
2—Sand Cutters, Type AA, 4' 8" and 5' 2", 220/440/3/60.
1—Sand Cutter, Type 74-50 "AM", 440/3/60.

SAND BLAST EQUIPMENT
AMERICAN WHEELABRATOR
1—42" x 48" Wheelabrator, 220/440/3/60.
1—36" x 42" Wheelabrator, 220/440/3/60.
1—6' Tablast, 220/440/3/60.

MAGNESIUM CLEANING CABINETS
8—Cabinets, 8000 CFM with Buffalo Exhausters, 7½ H.P., 220/440/3/60.

TUMBLING MILL
1—Sly Model 00 tilting type barrel with shot return.

EUCLID FOUNDRY & MACHINE EQUIPMENT COMPANY
14919 SARANAC ROAD — TELEPHONE: GLENVILLE 1-1222 — CLEVELAND 10, OHIO

INSPECT AT OUR EXPENSE!

Your travel expenses refunded if any machine in our warehouse is not as represented. Why don't you join the hundreds of foundries that are lowering costs and raising production with late type . . .

UNCONDITIONALLY GUARANTEED EQUIPMENT REBUILT BY UNIVERSAL

AIR COMPRESSORS
1—40 HP SULLIVAN, Model B-Bim #8, WL 60 w/Receiver.
1—25 HP INGERSOLL-RAND, slow speed, horiz. ER-1, 9 x 18.

BLOWERS
1—85 HP G.E. Cupola Blower, 24 oz.
1—40 HP SPENCER, 3600 CFM, 24 oz.
3—7½ HP FISHER, 16 oz.
15—CENTRIFUGAL BLOWERS, 350 CFM to 10,500 CFM.

CLEANING EQUIPMENT
1—AMERICAN #1 MULTITABLE, 6 aux. tables 15", main table 45".
1—AMERICAN WHEELABRATOR, 42" x 48" TUMBLAST w/skip charger.
1—ROBBINS SHAKEOUT, 4' x 2'.
1—AMERICAN #2 MULTITABLE, 5 tables, 37" dia.
1—PARSONS Sand Blast Room, 7' x 7' x 12'.
2—SIMPLICITY SHAKEOUTS, 4' x 8'.
1—LINK BELT SHAKEOUT, 5' x 8', 5 HP Motor.
4—GRINDERS, Swing frame, 15 HP.
2—TUMBLING BARRELS, Cast Iron, 36" x 24" w/2 HP Motor.
2—TUMBLING BARRELS, Square, 34" x 48".
2—TUMBLING BARRELS, Side Tilt, 18" wide x 20" deep.

CONVEYORS
1—HEWITT-ROBINS, Shaker Type, vibrating, 100' long.
1—JEFFREY, 28' long, 20" belt, troughing idlers.
1—LINK-BELT, 50' long, 19" rubber belt, w/drive.
1—APRON FEED, 10'7" centers, w/drive.
1—STEEL PLATE MOLD, 90' centers, 30" belt, w/drive.
2—STEEL PLATE MOLD, 90' centers, 24" belt, w/drive.
6—SAND BELT CONVEYORS, 10' centers to 140' centers, 18" to 36" belt, complete w/drives and hoppers.
2—CASTING CONVEYORS, wire mesh, 18" x 32" w/drive.
FOUNDRY TYPE ROLLER CONVEYOR—ALL SIZES—SEND REQUIREMENTS

CUPOLAS
1—WHITING, #4, with skip charger, motor and blower.
1—WHITING #6, Complete.
1—WHITING #7.
1—MORRIS #9, w/skip, mixing ladle, never used.
2—WHITING, #8, EXCELLENT CONDITION, COMPLETE.
1—MODERN, #3, 46' shell, w/blower.
1—SKIP CHARGER, 3 bottom drop buckets, blower, motor, and scale for #9 Cupola.

CORE BLOWERS
1—CB-400 CHAMPION. 1—3K DEMMLER.
2—#2 REDFORDS. 1—#92 OSBORN.
1—FEDERAL, San-Blo.

DUST COLLECTING
1—CYCLONE Dust Collector, 10' dia. x 22" outlet.
1—SLY, 83" wide x 43" deep x 113" high, 4' hopper, 13" inlet, bag type.

FLASKS & CORE PLATES
400 TONS, CAST STEEL, STRUCTURAL STEEL and STERLING TYPE FLOOR FLASKS—ALL SIZES.
20 TONS, FLAT STEEL and PERFORATED STEEL CORE PLATES.
SEND FOR COMPLETE LISTINGS.

FURNACES—DIRECT ARC MELTING
1—150#/hr. "LECTROMELT".
1—250#/hr. Hydraulic Top Charge.
1—500#/hr. "LECTROMELT".
1—1 Ton WHITING Top charge.
1—2 Ton SWINDELL, Top charge.
1—1000# SWINDELL.
1—2 Ton WHITING top charge.
1—6 Ton HEROULT.
Several 3 Ton to 10 Ton capacity Side and Top Charge Furnaces.

FURNACES—DETROIT "ROCKING"
2—200# cap. DETROIT, complete.
3—350# cap. DETROIT, complete.
1—1000# cap. DETROIT, complete.
1—3000# cap. DETROIT, less Transformer.
1—1500# DETROIT, Complete.
1—60# DETROIT, Complete.

FURNACES—INDUCTION MELTING
1—20 KW AJAX Spark Gap High Frequency, 17 lb. capacity in steel.
2—60 KW, AJAX-TAMA-WYATT, Alum.
1—80 KW, GE, 9600 Cy., MG Set.
3—333 KW, AJAX-TAMA-WYATT, 1500# Alum.
1—175 KW, 960 Cy., MG Set, 1000# Cruc. NEVER USED.
1—166 KW, AJAX, 60 Cy., Alum.

FURNACES—OIL AND GAS
1—HAUSFELD Tilting #675, 250 cruc. Oil.
1—FISHER 4 Burner MNP, 1700#, gas.
3—WALKER YORK #400 cruc. tilting, coke fired.
1—HAUSFELD Tilting, 1200# Mag.
3—MONARCH Oil Fired Stat., #60 cruc.
5—FISHER 400# Tilting, Oil fired.
1—SKLENAR, 2000#, Oil Fired.

LADLES & POURING DEVICES
2—6 TON TEAPOT, Worm Geared.
1—10 TON WHITING, Lip and Bottom Pour, EZ mechanism, used once.
4—10 TON BOTTOM POUR, 55" x 55".
2—15 TON BOTTOM POUR, 65" x 59".
2—45 TON TREADWELL, Excellent.
1—20 Ton Lip Pour, 72" x 72".
1—SWINDELL, Elec. Holding.

MOLDING MACHINES
5—MILWAUKEE Jolt Pin Lift 32" x 38".
1—J & J #612 Port. Rollover, 24" x 30".
1—J & J #815-B Rollover.
3—INTERNATIONAL "G", 24" x 10" Jolt Rollovers.
5—OSBORN Jolt Rollovers, Hand Draw, #142.
3—OSBORN 710J Jolt Squeeze Strippers, 16" x 25" table.
1—SPO Jolt Stripper, #3102, 36" x 51".
3—TABOR Jolt Squeeze in Head.
1—OSBORN #243 Jolt Rollover.
1—OSBORN #559 Jolt Stripper, 25" x 30".
1—DAVENPORT #28A Jolt Rollover.
3—HERMAN Rollover & Jar, 6000#, 60" x 80".
10—SPO #110 J Jolt Squeezers.
11—DAVENPORT #30-T Jolt Strippers.
2—OSBORN #405 Jolt Rollovers.
2—TABOR POWER ROLLOVERS, #2242 w/clamps, late.
1—TABOR Jolt Stripper, 20" x 20", 4" draw.
1—SPO, 9336, Jolt Clamp rollover draw.

MULLERS AND MIXERS
1—SIMPSON #0, NEVER USED.
1—SIMPSON #1, Style C.
1—SIMPSON #2, Unit Drive.
2—SIMPSON #3, Enclosed Gears.
2—CLEARFIELD #610 and #920.
1—BEARDSLEY & PIPER #60 SPEEDMULLER, 60 HP motor, SKIP LOADER.
1—B & P Speedmuller, #40.

OVENS
2—FOUNDRY EQUIPMENT, 2 compartment 5' wide x 6' high x 10' deep, Oil Fired, Recirculating, Walk-in.
1—FOUNDRY EQUIPMENT, Oil Fired, 4 drawers.
2—ROSS 2 comp., rack, gas, 6½" x 14" x 7".
1—CRAWFORD, Gas Fired, 3 drawers.
1—HOTPOINT EDISON, ELECTRIC, 6 drawers, 30" x 40" x 8".
1—CORE OVEN, 82" high x 6' deep x 12' wide, 2 sets of drawers, gas or oil.
1—YOUNG BROS. 3 compartment, kiln type baking oven, electrically heated, with CONTROLS.
1—MAHON ANNEALING OVEN, GAS FIRED, 9' x 18' x 6½', 1600 degrees F., controls, recirculating.
1—DESPATCH TOWER, Gas Fired, 27 racks, 11' x 12' x 40'6" high.

SAND CUTTERS
5—AMERICAN SAND CUTTERS—
1—MODEL "AA", 60" reel, Gas Driven.
1—MODEL "K", 72" reel, Gas Driven.
1—MODEL "F", 80" reel, Gas Driven.
1—MODEL "D", 76" x 96".
1—SANDMASTER, 70/102, New in 1950, Rubber Tires.
1—MOULDERS' FRIEND, 60", late.

SAND LABORATORY EQUIPMENT
1—TEST CORE BAKING OVEN #606.
1—MOISTURE TELLER #278T.

SAND PREPARATORS
1—REDDY SANDY UNIT.
2—JEFFREY SANDITIONERS, Portable.
5—SCREENERATORS, Size "S" and "M".
3—ROYER SAND BLENDERS, 16" belt, 12" belt, 8" belt.
1—LINK BELT REVIVIFIER, Size 5.
2—B & P SAND CONDITIONERS, portable.
1—LOWE GYRATORY RIDDLE.
1—HETHERINGTON & BERNER SAND DRYER, rotary, oil fired, #552.

SAND SLINGERS
1—BEARDSLEY & PIPER MOTIVE JR. 19" head.
1—BEARDSLEY & PIPER TRACTOR TYPE 16" head, magnetic separator.
1—PORTABLE SLINGER, 16" head, 4' long, on Truck.

TESTING MACHINES
1—TINIUS OLSEN, UNIVERSAL, 100,000# capacity.
1—TINIUS OLSEN, BRINELL HARDNESS, 3,000 KG.
1—RIEHLE, UNIVERSAL, 2 screw mechanical, 100,000# capacity.
1—RIEHLE, BRINELL HARDNESS, hydraulic, 3,000 KG.
1—ROCKWELL, HARDNESS, #5JR with "C" Brail.
1—BALDWIN - TATE - EMERY, UNIVERSAL, Hydraulic tensile, 24,000#.

TRUCKS
2—CLARK, FORK LIFT, 10S" lift, Gas.
1—HOUGH PAYLOADER, 1000# capacity.
2—BELL PRIME MOVERS, 1000# capacity, Gas driven.

IN ADDITION: We are now liquidating several large foundries. Send your requirements today. We'll fill them!

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15539 SARANAC ROAD **CLEVELAND 10, OHIO**

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AIR COMPRESSORS

1—**BURY** Class URB, single stage Size 8 x 8, horizontal 180 CFM, with air receiver, switch gear, 30 HP motor and all electrical.
1—**CHICAGO-PNEUMATIC** Size 8 x 8 Single Stage, Horizontal 180 CFM, with NEW tank, 30 HP motor and all electrical.

AIR & ELECTRIC HOISTS

7—**INGERSOLL-RAND** Size D, 4000 lbs.
1—**INGERSOLL-RAND** Size DR, 2000 lbs.
2—**INGERSOLL-RAND** Size E, 10,000 lbs.
2—**INGERSOLL-RAND** Size D-6, 6000 lbs.
1—**CHICAGO-PNEUMATIC** Model A, 1000#.
1—**ELECTRO-LIFT** 3000 lbs capacity, low head room, cable type, 4 Hp motor.
1—**DETROIT** 5 ton cap. Model LHR, 440 volt Ser. #19317E 1953 unit.
6—**INGERSOLL-RAND** Size LC-7 Air Bloc Type 700 lbs cap.
1—**INGERSOLL-RAND** Size RC-10 Air Bloc Type 1000 lbs capacity.
2—**INGERSOLL-RAND** Size B, 1000 lbs cap.
1—**SHAW-BOX** Load Lifter Jr. 1000 lbs Cap.
1—**COMET** 1000 lbs capacity electric hoist

BUCKET ELEVATOR

1—**JEFFREY** 50' centers of drive pulleys, 106' belting 13", with continuous type buckets, Jones Reducer, motor etc.

CUPOLA CHARGER

1—**WHITING** 3 Ton Tiger Monorail, type 2 motor wishbone charger, cab operated, with controls, 5 buckets etc, 80' tram beam track & conductor. Buckets 48" x 52" w/super structure. Late unit.

CORE BLOWERS

3—**OSBORN** No.'s 91 & 92 with air clamps.
2—**REDFORD** No. 1 Cartridge Bench Type.
1—**DEMMLER** No. 1 with Air Clamps.
1—**DEMMLER** No. 3K with air clamps, cores to 25 lbs cap. 1953 unit.
2—**CHAMPION** No. CB-400, weight of core to 300 lbs, draw 6½".
1—**REDFORD** #2 Stationary Magazine Type, air clamps, cores to 5 lbs, NEW 1953.

CUT-OFF SAWS & MACHINES

2—**TESSEMER** Model H, Sprue Cutter ¾" cap. brass, with 3 HP motor.
2—**CLIMAX** #2A Wire Straighteners, 4 Sizes 1/16" to ¼" with 1 HP V-belt.

CONVEYORS-ROLLER-BELT-TROUGHING

1000'—**MATHEWS** Gravity Roller, 10" wide 2½" roller dia. 4" centers.
200'—Gravity Roller 16" wide—2¾" diam. 4" centers, above rail.
1200'—**MATHEWS** Gravity Roller 18" wide—2¾" diam. 4" centers, above rail. Like New.
1—**FARQUHAR** 18" x 35' Model 334-3, portable trough with 5HP motor and elect.
1—**FARQUHAR** 18" x 19' Model 341 Undercar unloader, rubber belt, 5 HP motor.
125'—**LOUDEN** Monorail, complete with four 20' bridges and all accessories.
300'—**STANDARD** Gravity Roller 24" wide, 3½" diam. on 6" centers, 6" channel.
2—35' x 24" Troughing Conveyors, with 70' of 24" rubber belting, head and tail pulleys, troughed idlers, 3 HP motor & drive.
500'—**MATHEWS** Gravity Roller 24" wide 2¾" diam on 4" centers.

CUPOLA & FURNACE BLOWERS

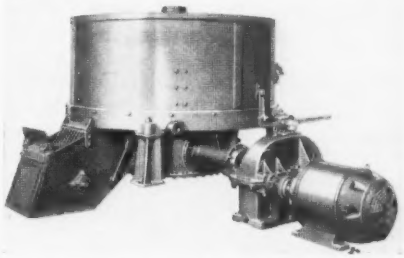
1—**GE** Centrifugal Type FS3670-9400 Serial #27006, w/motor 100 HP, 3600 RPM.
1—**BUFFALO FORGE** No. 7-E, 25 HP-32 oz. 1600 CFM, 28" wheel.
9—Furnace Blowers 1-5-7½ HP-16 oz.

ELECTRIC FURNACES

3—**DETROIT** Type AA, Rocking, 1500 to 2000 lbs cold charge, w/400 KVA transformers 4650 primary volts, single phase.
2—**DETROIT** Type AA, Rocking, 750 to 1000 lbs cold charge, w/250 KVA transformers, 4650 primary volts, single phase.

GAS & OIL FIRED FURNACES

2—**LINDBERG-FISHER** Model MNP, size 2400, gas or oil fired, w/motors-blowers, NEW pots, electrical tilting mechanisms.
2—**LINDBERG-FISHER** #400 Crucible, Type BBI, hand tilting, gas or oil fired, with motors-blowers, 1950 units.
1—**STROMAN** #600, Model U Tilting Reverberatory, gas or oil fired, w/motor-blower, 1949 unit.
2—**STANDARD** #30-#150 Crucible, Stationary gas or oil fired, w/motor-blower.
1—**LINDBERG-FISHER** Size 225 Crucible, Model MNP, motorized nose pouring, with gas or oil burner, 3 HP motor & blower and all electrical.
1—**CAMPBELL-HAUSFELD** #200 Crucible Stationary Furnace gas fired, with motor and blower, NEW 1952.



5—**SIMPSON** No. 3 Sand Mullers style C separate drive type, enclosed gearing, 8' pan diameter, 3000 lbs batch size. Complete with 40 HP Howell Motors and Falk Speed Reducers. These units were **NEW** in 1946 and are being offered **RECONDITIONED AND GUARANTEED.**

GRINDING EQUIPMENT

2—**FOX** No. 5 High Speed Stand Grinders, wheel size 24" x 3" w/10 HP motor.
1—**FOX** No. 7 High Speed Stand Grinder, wheel size 30" x 3", w/15 HP motor.
1—**HAMMOND** WR-1 Double End Snagging 10 HP—wheel size 24" x 3" x 10".
1—**STANDARD** #30 Double End Multi-Speed Model 101—10 HP—wheel 24" x 3".
1—**U. S.** Double End Snag, Model 65, 20 HP-4 speed unit, wheel 24" x 3".
1—**MARSCHKE** Swing Frame, 3 HP-220/440.
3—**MARSCHKE** Swing Frame 15 HP 2 speed unit, wheel size 24" x 3" x 12".
3—**MARSCHKE** Swing Frame 20 HP—3 speed units,wheel size 24" x 3" x 12".
1—**QUEEN CITY** Model 100 Double End Disc. 10 HP motor, wheel 20" x 2" x 2".
1—**U. S.** Electric Swing Frame, 15 HP, 2 speed unit, wheel size 24" x 3" x 12".

HOUGH PAYLOADER

1—Model HA, 10 cubic foot capacity bucket, manually controlled, **REBUILT MOTOR.**

LADLES & POURING DEVICES

10—**WHITING** Riveted Crane Ladles, taper side with V-bail (E-Z Pour) enclosed gearing nose pouring, ½-1 ton.
6—**MODERN** 1500# Cylindrical Geared, with crane bails & floor stands. NEW covers, 30" dia x 29" length.
2—**MODERN** Mixing Ladles, on trunnions, geared, covered & lined, 40" dia. x 60" length, with preheaters.
6—**INDUSTRIAL,** Lip pour, 24" diam, x 24" H, 1600 lbs cap. Enclosed Timken gear.
12—**WHITING** Models 1000 & 2000 Pouring Device w/500# ladles, hand tilt devices.
6—**MODERN** Models FA-9 Pouring Devices with 500 Lb. covered ladles, trolley, & hand Tilt devices.

MOLD CONVEYOR

1—**PALMER** "B" w/no. HD-12 speed reducer & Reeves variable drive 4-1 ratio, 200' straight track, 7-3' sections 90° curves 1-6' section; 2-1' section 30° curves, car size 18" x 42", 80 cars.

MOLDING MACHINES

1—**DAVENPORT** #28SA Jolt Rollover & Pattern Draw 30" x 40" table, 12" draw.
2—**INTERNATIONAL** RES Jolt Squeeze Rollover Draw Size 15" x 8" draw, flask cap. 24" x 42" O.D.
1—**INTERNATIONAL** PKL Jolt Squeeze Air Pin Lift 18" x 24" table, 5½" draw.
2—**INTERNATIONAL** G Jolt Rollover Foot Draw 18" x 56" table, 8" draw, (other 20" x 8").
1—**INTERNATIONAL** LP-10 pin lift machine.
1—**MILWAUKEE** #1030 Jolt Pin Lift, 28" x 34" table, 12" draw, 1000 lbs cap.
2—**MILWAUKEE** No. 124-6 Jolt Squeeze, 17" x 26" table, 12" cylinder. Portable.
3—**OSBORN** No. 559 Portable Jolt Strippers 25" x 30" table, 1200 lbs jolt.
2—**OSBORN** No. 601 Jolt Rollover Pattern Draw, 600 lbs cap. overall flask 30".
6—**OSBORN** No. 275 J, Jolt Squeezers.
2—**OSBORN** No. 142 Jolt Rollover Foot Draw 14½" x 24" table, 8" draw, 350#.
2—**OSBORN** No. 710J Jolt Squeeze Pin Lift, 16" x 25" table, 6" draw, 10" squeeze cyl.
2—**OSBORN** No. 712PJ Jolt Squeeze Pin Lift, 18" x 28" table, 6" draw, 12" squeeze cyl.
2—**HERMAN** 40" x 60"—13" Diam. Cyl. Heavy Duty Bumper Plain Jolt Machine.
2—**JOHNSTON & JENNINGS** No. 815-B Jolt Rollover Pattern Draw, 30" x 40" table, 15" draw, 1500 lbs cap. air operated head.
1—**TABOR** 22" Shockless Jar, Rollover & Pattern Draw, 30" x 40" table, 12" draw, 600 lbs cap. portable.
2—**TABOR** 30" Shockless Jar Rollover & Pattern Draw, 30" x 40" table, 12" draw, 1000 lbs. cap. Portable or Stationary.
3—**SPO** No. 506 Jolt Rock-Over Pattern Draw Machines, 24" x 25" table, 10" draw, 600 lbs cap. Portable or Stationary.
2—**SPO** No. 507 Jolt Rock-Over Pattern Draw 32" x 40" table, variable draw 10" to 20", 1500 lbs cap. 1948 models.
1—**SPO** No. 508 Jolt Rock-Over Pattern Draw Machine, 28" x 30" table, draw 9" cap. 1200 lbs. Jolt cap.
1—**SPO** No. 413-D Jolt Squeeze Power Rock-Over Pattern Draw 24" x 25" table, 10" draw, 600 lb cap. max. flask 26" x 36".
1—**SPO** No. 213-D Jolt Squeeze Strip Machine table 19" x 28", 8" draw, 800 lbs.

SAND MULLERS

1—**BEARDSLEY & PIPER** No. 60 Speed Muller, Model G, 10 cubic ft. batch size, with 50 HP motor and all electrical.
1—**BEARDSLEY & PIPER** No. 30 Speed Muller 3 cubic ft. batch size, with motor & electrical, serial No. 30-2.
3—**SIMPSON** #2 style UD, unit drive type, 6' pan diameter, 1500# batch size, with skip hoist loader, dust hood, water meter. 20 HP motor.
1—**BAKER PERKINS** #5A continuous muller, 100 to 120 tons per hour.
1—**BESSER** Paddle mixer, 36 x 42" horizontal drum, 12 cu. ft. cap. w/7½ HP motor and v-belt drive.

SAND BLASTING EQUIPMENT

1—**AMERICAN WHEELABRATOR** 66" Diameter Swing Table, w/shot return.
1—**PANGBORN** No. GK-2 Roto-Blast Barrel w/bucket loader etc. 7 cubic feet cap., drum size 30" x 38", airless type, 1943.

SAND PREPARATORS

8—**BEARDSLEY & PIPER** Models "S" "M" Screenerators, portable units.
1—**BEARDSLEY & PIPER** #70 Portable Sand Preparators with magnetic separator, 90 cu. ft. hopper, gyrating screen, aerator, 1946 unit, ser. #SC-73.
1—**AMERICAN** Sand Cutter Model AM, size 69/45—serial #176—motors enclosed.
1—**AMERICAN** Sand Cutter Model BD, size 75/60—serial #722—motors enclosed.

SHAKEOUTS

1—**ROYER** Shakeout & Sand Conditioning Unit, Serial No. ST-47.
1—**SIMPLICITY** 4' x 6' Model B Serial No. 46-SOB-145, 5000 lbs cap.
1—**SIMPLICITY** 2' x 3' Model CA Gyrating Sand Screen—single deck—1 HP.
1—**SIMPLICITY** 4' x 10' model D with automatic crusher, 15,000 lbs, capacity, 1945.
1—**STONEY** core knockout machine.

SAND SLINGERS

1—**B & P** Tractor Type 13' arm 4" liner & cups, 19" head, w/spare head 22"-5" liner & cups—25 HP.
1—**B & P** Tractor Type 13' w/magnetic tower, 16" head, 4' ramming, 4" tip, 1946.

TUMBLING BARRELS

5—**SLY** 36" x 60" with 5 HP Gearhead motor & drive—built-in magnetic brake.
2—**SLY** 42" x 72" Square 10HP Gearhead motor & drive—built-in magnetic brake.
2—**SLY** 24" x 36" w/motor and drive.
1—**SLY** 42" x 66", Type C, 10 HP gearhead motor drive—built-in magnetic brake.

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Is your 1955 advertising budget slightly small for the big job expected of it?

There are several ways you can s-t-r-e-t-c-h that budget.

1. **By doing something with layout and copy appeals that will step up the effectiveness of the white space you buy.**
2. **By re-evaluating the publication picture in the light of today's opportunities, and comparing the *effective coverage* each magazine gives you per dollars invested.**
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The *first* calls for a method of measuring attention and readership. That's where Starch reports can help you. Three Penton publications are regularly "Starched" and reports are available from Daniel Starch & Staff. All Penton publications offer helpful information that will assist you in tailoring your advertising to their audiences.

The *second* involves better yardsticks to aid in space buying. Here, too, Penton can give you a lot of help. For instance, we have standardized on the modern Standard Industrial Classification of the U.S. Census Bureau to aid you in making comparisons. Plant counts, and size of plant, so necessary in determining *effective coverage* are available on *all* of our publications.

The *third* way to stretch your budget—merchandising your advertising—is one in which we are prepared to help you with reprints, direct mail service, and special list selections.

Will you call on us for cooperation?

THE PENTON PUBLISHING COMPANY

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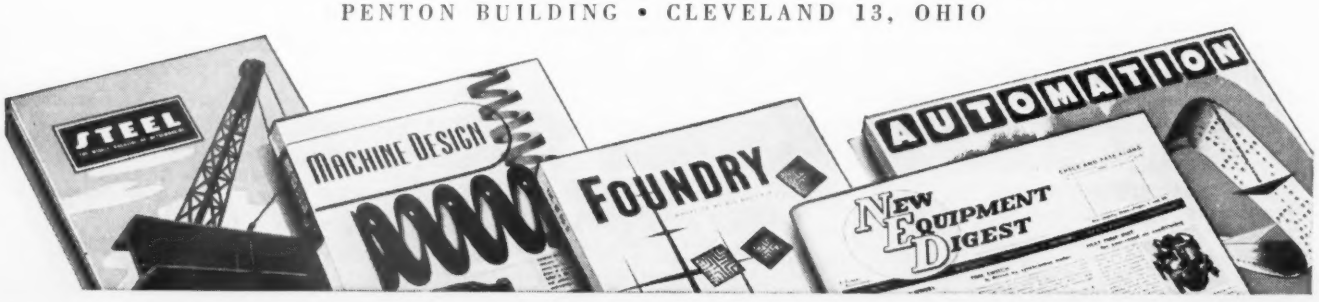

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■ Baker 6000-lb. Fork Truck stacks Ford engine blocks in temporary storage. Next move is to engine plant.

Ford Foundry speeds handling with BAKER TRUCKS

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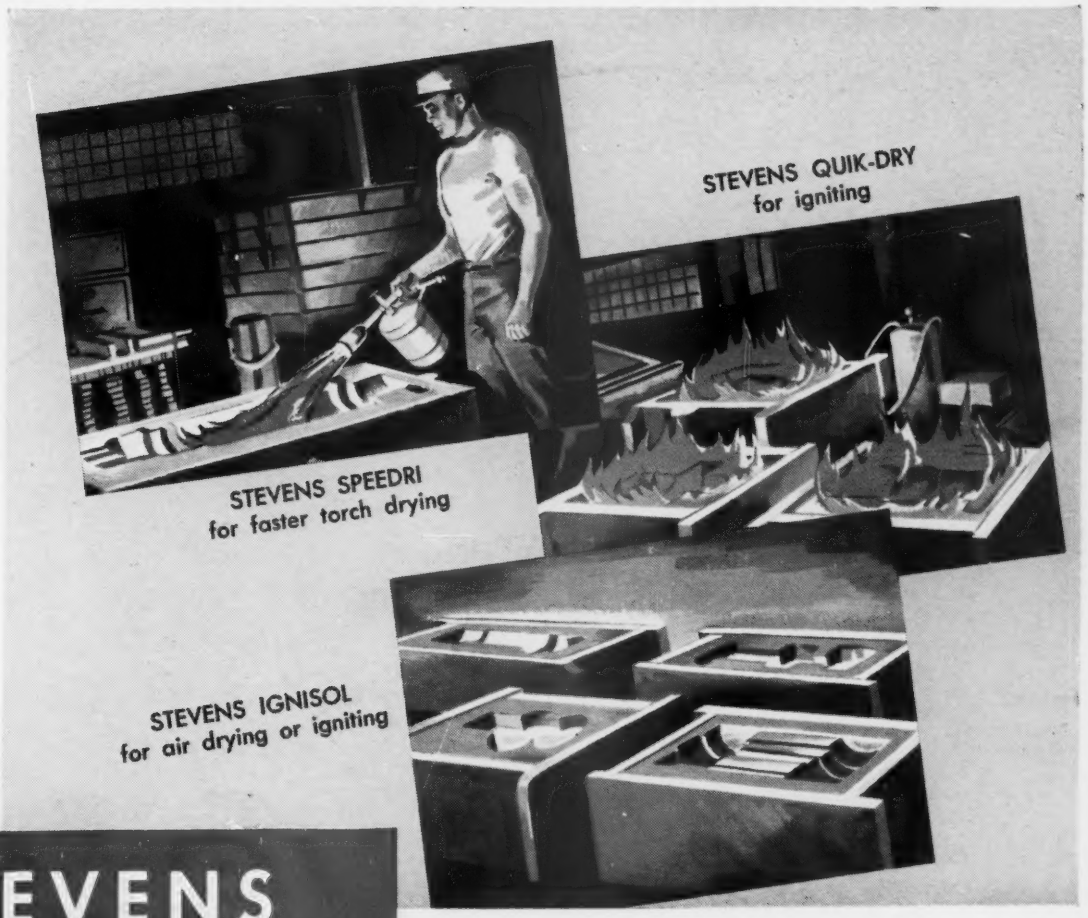

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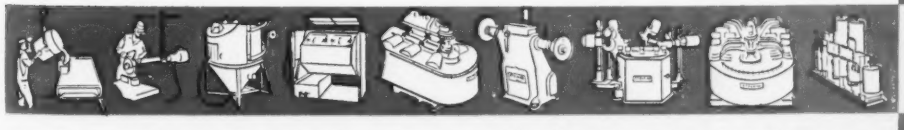

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